

Review of the South American cichlid genus *Mesonauta* Günther (Teleostei, Cichlidae) with descriptions of two new species

by

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With 23 figures

ABSTRACT

Five species of *Mesonauta* are diagnosed and described. Two of them are new. *Mesonauta insignis* (Heckel), in the upper Rio Negro and Rio Orinoco, is characterized especially by slender shape and by having a single wide dark bar above the abdomen instead of two. *Mesonauta festivus* (Heckel), in the Paraguay and Bolivian Amazon basins, Rio Jamari and lower Rio Tapajós, is the most deep bodied *Mesonauta* species and has microbranchiospines on all four gill arches but rarely preopercular scales; the Rio Tapajós population can be distinguished by being more slender and by averaging higher anal spine count and lower abdominal vertebral count than more southern *M. festivus*. *Mesonauta acora* (Castelnau), in the Tocantins and Xingu drainages, has scales on the preopercle, microbranchiospines on all gill arches and a distinctive mottled colour pattern. *Mesonauta egregius* n. sp., in the Colombian Orinoco basin, has the vertical dark bar above the anal fin origin divided, but it has no horizontal striping and also features characteristic low meristics, such as 13+13 vertebrae instead of 12+14 or 13+14, and usually A. VII.11 which is lower than in the other species. *Mesonauta mirificus* n. sp., in Peruvian Amazonia, has the dark vertical bar above the anal fin origin divided into two and presents thin dark stripes along the sides. Additional species of *Mesonauta* exist, but shortage of suitable material prevents formal descriptions.

INTRODUCTION

The genus *Mesonauta* was erected by GÜNTHER (1862) to include the nominal species *Heros insignis* and *Heros festivus*, both described by HECKEL (1840), and *Chromys acora* Castelnau (1855). Günther synonymized all under the name of *insignis*. Later authors

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generally recognized only one species, calling it *festivus*, and usually referred it to the catch-all genus *Cichlasoma* Swainson. KULLANDER (1983) resurrected *Mesonauta* and later (KULLANDER 1986) gave a revised diagnosis of the genus and suggested a close relationship to *Pterophyllum* Heckel.

KULLANDER (1986) showed that *insignis* has priority over *festivus* by action of GÜNTHER (1862) as first reviser, and described two species which were identified as *M. insignis* and *M. festivus* respectively. He also indicated that the *M. insignis* referred to might be a composite, especially since the study dealt with only Peruvian specimens whereas the type locality of *M. insignis* is in the upper Rio Negro in Brazil. Both KULLANDER (1986) and KULLANDER & NIJSSEN (1989) treated *Chromys acora* as a valid species of *Mesonauta*, but neither paper gave reasons for the revalidation or a useful diagnosis.

The senior author was recently able to collect a good series of *Mesonauta* from the type locality area of *M. festivus*, enabling comparison with material from the Rio Madre de Dios drainage previously identified as *M. festivus* (KULLANDER 1986). We have also studied series of *Mesonauta* from the Rio Tapajós, Rio Tocantins, Rio Xingu, Rio Paraguay, Rio Orinoco and upper Rio Negro drainages. In comparing those collections it became evident also that KULLANDER'S (1986) Peruvian *M. insignis* were misidentified.

The main purpose of this paper is to present revised diagnoses for the three named species of *Mesonauta*: *M. insignis*, *M. festivus* and *M. acora*. The genus includes four or maybe five more species, and we take this opportunity to describe the two of them of which we have adequate material. Regrettably, we have not been able to satisfactorily investigate the status of populations of *Mesonauta* from the Guianas and along the Rio Solimoes-Amazonas, mainly due to a lack of suitable well preserved material.

METHODS

Measurements and counts are taken as described by KULLANDER (1986). Standard length (SL) is measured from the tip of the upper jaw to the middle of the base of the caudal fin. The length of the caudal peduncle was measured along the dorsal margin. Scales in a horizontal row (E1 row scales) are a count of the scale row above that including the lower lateral line, and scales in a transverse row includes scales in an oblique vertical row from the anal fin origin upward and forward to the dorsal fin. Teeth numbers are for one outer row hemiseries only. Measurements of the length and width of the lower pharyngeal tooth plate and of the length and width of the dentigerous surface of the tooth plate follow BAREL *et al.* (1977). Numbering of vertical dark bars is explained in the generic description below and in Fig. 1; it is different from any numbering system used for South American cichlids before. No other new terminology is introduced here. Drawings of pharyngeal bones were made with the help of a Wild M5 drawing tube. Vertebral counts were made from radiographs made with a Philips MG-105 low voltage X-ray unit. Bibliographies cite only references to specimens that we have examined.

MUSEUM ACRONYMS

ANSP – Academy of Natural Sciences of Philadelphia, Philadelphia

BMNH – British Museum (Natural History), London

CAS – California Academy of Sciences, San Francisco

CAS SU – Stanford University Museum, now in CAS

FMNH – Field Museum of Natural History, Chicago

ICN-MHN – Instituto de Ciencias Naturales, Museo de Historia Natural, Universidad Nacional de Colombia, Bogotá

INPA – Instituto Nacional de Pesquisas da Amazônia, Manaus

MHNG – Muséum d'Histoire naturelle, Geneva

MNRJ – Museu Nacional, Rio de Janeiro

MUSM – Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima

MZUSP – Museu de Zoologia da Universidade de São Paulo

NRM – Swedish Museum of Natural History, Stockholm

NMW – Naturhistorisches Museum, Vienna

USNM – National Museum of Natural History, Washington, DC.

Mesonauta Günther

Mesonauta Günther, 1862, p. 300 (type species by indication (monotypy) *Heros insignis* Heckel).

Mesonauta has been recognized most recently (KULLANDER 1986) as a cichlasomine genus, having four lateralis canal foramina on the dentary bone. It is probably closely related to *Pterophyllum*, with which it shares extremely elongated, thickened first pelvic fin ray and pleural ribs on the anterior 1- 4 caudal vertebrae.

Mesonauta is distinguished from *Pterophyllum* by more slender shape, depth not over 61%SL vs more than 65%SL, larger scales (E1 scales ≤ 27 vs ≥ 27), shorter soft vertical fins (soft dorsal rays less than 13 instead of more than 18, soft anal rays less than 15 instead of more than 18) and more dorsal spines (14-16 instead of 11-13). *Pterophyllum* species have a pronounced pattern of dark vertical bars, whereas *Mesonauta* species have an oblique lateral band from the mouth to the soft dorsal fin, less intensely pigmented and often irregular vertical bars below the band, and a prominent ocellated spot on the caudal fin base.

Mesonauta, *Pterophyllum*, *Symphysodon* Heckel, *Uaru* Heckel, and *Heros* Heckel, probably form a monophyletic assemblage among the cichlasomines. They all have long projections of the swimbladder extending well back into the caudal region. The lower pharyngeal tooth plate is stout, with a heartshaped dentigerous area and long, strongly compressed teeth. The anal fin is long, with 5-9, usually 7-8 spines, and 9-31 rays (either about 10-14, or nearly 30). Usually they have more caudal than abdominal vertebrae. Except in *Symphysodon* the anterior jaw teeth bear a ledge on the lingual face, topped by one or more small cusps. In *Symphysodon* the teeth are simple and reduced in number.

Mesonauta species are all very similar in shape and colour pattern. Species accounts in this paper refer chiefly to species diagnostic characters and intraspecific variation, below are reviewed characters shared by all species, with comments on variation.

Most meristic data are presented in Tables 2-5. Measurements are given in Tables 1, 6-10, and morphometry is illustrated in Figs 2 and 17. A key to named species is given on p. 417 and also Fig. 1 should be helpful in identification work.

Size. The largest specimen covered by this study is an *M. festivus*, 115.7 mm SL, but we have seen specimens of other species slightly larger. According to STAWIKOWSKI &

WERNER (1989) both *M. festivus* and *M. insignis* (as then understood), would reach more than 20 cm (total) length.

S e x u a l d i m o r p h i s m . There are no known sexual differences in body shape, fin shape or colour pattern. We separated sexes by the shape of the genital papilla.

S h a p e . The body is deep and elevated, laterally strongly compressed, with wide nape and thin posterior trunk. The prepelvic contour appears concave as the chest projects. The caudal peduncle is notably short, its margins of about equal length or the dorsal margin distinctly longer than the ventral. There is much variation in morphometry within samples, and proportional measurements do not fully separate species or geographic populations. Most of the interspecific variation may be described by the negatively correlated body depth and snout length, whereby *M. insignis* with long snout and slender body forms one extreme and *M. festivus* with short snout and deep body the other (Table 1, Fig. 2).

S c a l e s . El row scales number 24-27 (Table 2). The scales are ctenoid except anteriorly on the nape, on the cheek, the gill cover, and the distal interradiial scales. The predorsal squamation is irregular (stochastic) with about 15-17 scales along the midline, anteriorly about the size of flank scales, posteriorly slightly smaller. Scale rows around the caudal peduncle 20. The cheek is completely scaled, with 3, rarely 4 horizontal scale rows below the eye; one vertical row between the orbit and the preopercle. About three oblique rows of scales on the opercle, a single row on the subopercle and the interopercle. Scales in the transverse row, from the anal fin origin up, vary in number, 4-4½ above the upper lateral line, 11-14 below. Whereas we count 11 scales below the lateral line in *M. mirificus*, mostly 13 in *M. festivus* and usually 12 in the rest, we note that the count is not satisfactorily repeatable and do not use it for species diagnostics.

Lateral line scale counts are given in Table 3. Scales between the upper lateral line and the dorsal fin 6 anteriorly, 3, occasionally 4 posteriorly. Two scale rows between the lateral lines. Caudal fin accessory lateral lines between rays D2-D3 and V4-V5.

F i n s c a l e s . The pectoral and pelvic fins are naked. The soft dorsal and anal fins are scaled. The basal scaled area of the caudal fin has a concave hind edge, with marginal scales extending to at most the middle of the fin.

F i n s . The first dorsal fin spine is situated at or, usually, slightly posterior to a vertical from the pelvic fin origin. The spines increase in length to the last. The soft dorsal fin is pointed, usually with anterior rays produced and forming a filament extending at most slightly beyond the caudal fin. Dorsal fin counts, see Table 4.

The anal fin origin is slightly or distinctly posterior to the middle of the body. The soft anal fin is pointed, with middle rays forming a point reaching at most slightly beyond the caudal fin. Anal fin counts, see Table 4. The caudal fin is rounded and has 16 principal rays. The pectoral fin is short, rounded, reaching to above the 3rd or 4th anal spine, the 3rd ray longest, nearly always with 11 rays.

The pelvic fin is pointed and the thick outer branch of the first ray is produced, forming a filament that may exceed the standard length in length, and which in adults reaches to the base of the caudal fin or at most to the hind margin of the caudal fin. The filament is often broken in preserved specimens and it is often difficult to decide whether it is undamaged, hence we only record minimum-maximum lengths of this fin. *Mesonauta* was initially diagnosed (GÜNTHER 1862) as having the pelvic fin origin anterior to a vertical from the dorsal fin origin, whereas in other cichlids the pelvic fin origin is more posterior. In *Pterophyllum*, the relative position of the pelvic fin is even more anterior, and we find that there is individual variation among *Mesonauta* specimens, some having the

pelvic fin insertion at a vertical from the base of the first dorsal spine, others having it very slightly in advance of that vertical. The character reflects anterior protrusion of the chest, not anatomical differences in the pelvic fin insertion compared to other cichlids.

Jaw teeth. The teeth of the outer row are larger than those of inner rows and increase in size toward the symphysis; in the lower jaw the anterior 5+5 teeth are distinctly enlarged compared to the remainder (Fig. 3). The anterior teeth are subprocumbent, and the anterior upper jaw teeth are larger than the corresponding lower jaw teeth. A gap separating the labial row from the inner band of smaller teeth is distinct in the upper jaw but not in the lower jaw. Counts of teeth in descriptions are for one hemiseries only. The anterior outer row teeth are principally cylindrical, with a pointed and recurved cusp with concave lingual face except for a median ledge, but there is also a compressed ledge on the lingual face below the major cusp and it is tipped by one (usually) or two small cusps. The posterior labial and inner teeth are similar, but the major cusp tends to conical and the lingual ledge is much reduced on the smallest teeth.

Tooth plates. The lower pharyngeal bone is stout (Fig. 4) and wider than long with lengths 67-87% of the width. The dentigerous area is heartshaped and wider than long (lengths 65-80% of the width). Teeth along the posterior margin number 22-28, along the median 6-10 (Figs 4-9). The anteriormost teeth are pointed, subconical or with slightly excentric (caudal) cusp, often reclined, and a more or less protuberant minor anterior cusp or rounded edge; the shape changes gradually to posterior teeth which are compressed, with posterior major antrorse cusp and commonly one or two cusps topping the anterior margin (Fig. 5). Limited study suggest that rostral cusps are reduced in *M. acora* and *M. festivus* compared to other species, and that *M. acora* may have fewer, more spaced teeth than other species (Fig. 8). There is also some variation in the width of the bone (see *M. festivus* description) and in the width of the dentigerous area (see *M. mirificus* description) but we do not have material for deciding between ontogenetic, individual or taxonomic variation. The pattern of tooth implantation and the notably compressed shape of the teeth comes close to conditions in *Pterophyllum*, *Heros* (KULLANDER 1986, figs. 78 and 83), and *Uaru*. Other cichlids have a simply concave or incised posterior margin of both the dentigerous area and the bone.

Vertebrae. Within species, vertebral counts are modally 12+14=26, 13+13=26 or 13+14=27 (Table 5). The last number listed appears basal, with loss of one caudal vertebra in *M. egregius* and loss of one abdominal vertebra in populations of *M. festivus* and in *M. mirificus*. The *M. festivus* from Madre de Dios have one vertebra (loss of a caudal or abdominal vertebra nearly equally frequent) less than populations from Paraguay and Guaporé. The first hemapophysis is preceded by the pterygiophores of the first four anal spines, rarely three or five spines. The anterior two or three (rarely only the first or four) caudal vertebrae bear ribs continuing the pleural series.

Colour pattern. The ground colour is whitish or yellowish, commonly silvery on the chest. The top of the head and the back above the lateral band are darker than the sides below. There are no dark stripes or spots on the cheek or the gill cover.

The principal dark mark is a dark lateral band, which may appear as a row of more or less contiguous blotches. The band commences immediately posterior to the orbit and runs obliquely dorsal to the anterior part of the soft dorsal fin where it may fade away or continue more or less intensely pigmented to the tip of the fin. The lateral band continues anterior to the orbit to the tip of the snout; this preorbital stripe is usually bordered with a thin whitish line above and below.

The number of vertical bars is variable and provides species diagnostic characters. To facilitate reference they are numbered as explained below and in Fig. 1A.

Unless otherwise noted the dorsal fin is greyish with light dots on interradial membranes from about the middle of the spinous portion; the number of dots and their size increases caudally on the fin, so that posteriorly on the soft portion the interspaces are greatly reduced or absent. The caudal fin is greyish with light spots at least proximally and on the dorsal lobe, sometimes across the entire fin. Across the base of the dorsal lobe of the caudal fin is situated a prominent dark brown to black, ovate or rounded spot with light margin which anteriorly extends onto the posterior margin of the caudal peduncle; the light margin is usually not interrupted ventrally, but as a rule the dark pigment continues translaterally across the dorsal margin of the fin. The anal fin is usually greyish with some light spots proximally on the posterior interradial membranes, but may be immaculate. The pelvic fin is usually whitish along the anterior margin, dark on middle rays and hyaline on inner rays, but may be dark throughout in *M. mirificus* and *M. egregius*. The pectoral fin is hyaline.

Vertical bars: Most South American cichlids have a more or less prominent pattern of dark pigmented vertical areas recognized as vertical bars. These generally descend vertically from the countershaded dark back and reach the middle or lower sides. Variation in the bar pattern provides generic or species diagnostic characters for many taxa and bars are commonly numbered to facilitate reference, usually in postero-anterior succession (e.g., KULLANDER 1983) but sometimes in antero-posterior succession (e.g., KULLANDER 1980). Bar numbering also facilitates references to other, associated markings such as the midlateral spot and helps describing the general colour pattern. Homologization across sets of supraspecific taxa has never been made, and hence a uniform system of numbering has not been attempted.

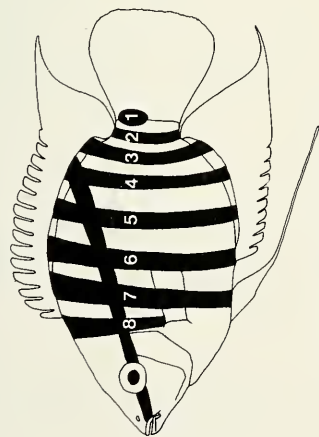
Among species of *Mesonauta* the division and merging of bars and other variation in the pattern of vertical bars provides for one excellent source of species diagnostic characters and we have wished to adopt in this paper a numbering system taking into account positional homology as far as possible.

Surveying other cichlids, it seems to us that among cichlasomine cichlids there is an underlying basic pattern irrespective of the very expression of the bar pattern in particular taxa. We note that as a rule there are eight, serially homologous, vertical dark markings across the caudal fin base and the flanks, which we number as follows in *Mesonauta*, see also Fig. 1A.

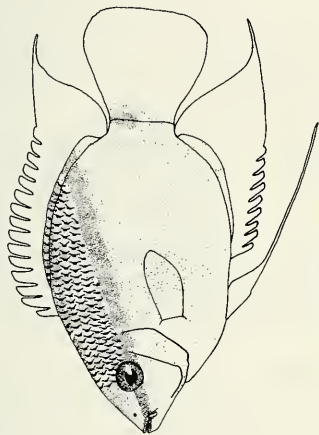
Bar 1 – across the base of the caudal fin. In *Mesonauta* and most other cichlasomines this bar is reduced to an ocellated spot on the dorsal half of the fin, and the commonly used descriptive term is caudal spot.

FIG. 1.

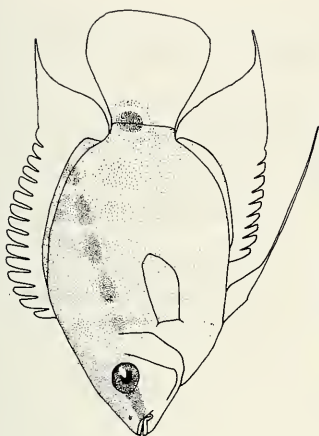
Colour pattern of *Mesonauta* species. Diagrammatic representation of A generalized pattern with numbered bars and (B-F) schematic representation of body patterns of the species, drawn on the same outline fish. In A bars are numbered from the posterior: bar 1, referred to as caudal spot), bar 2 on the caudal peduncle, bars 3 and 4 above the soft anal fin, bar 5 above the spinous anal fin, bar 6 above the origin of the anal fin (above the vent in most cichlasomines), bar 7 close behind the pectoral axilla, and bar 8 down from the nape. Bar 8 is usually very indistinct in *Mesonauta* species, the other bars (2-7) variously expressed, divided or united. -B, pattern of *M. insignis* with reticulated dorsal scales and united bars 6 and 7; -C, pattern of *M. festivus* with bars 3 and 4 merged; -D, pattern of *M. acora*, with bar 5 divided in a dorsal and a ventral portion; -E, pattern of *M. egregius* with bar 6 divided in two; -F, pattern of *M. mirificus* with bar 6 divided and with thin dark lines along the side.



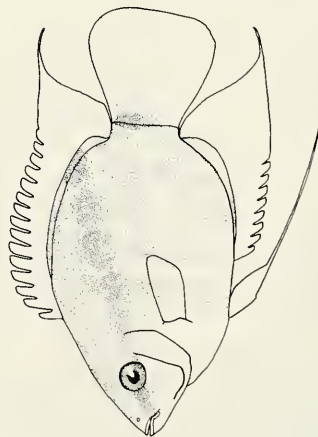
A Principal bar pattern



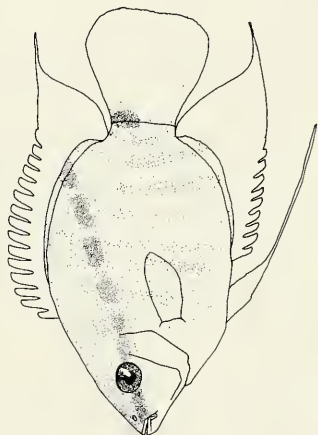
B *Mesonauta insignis*



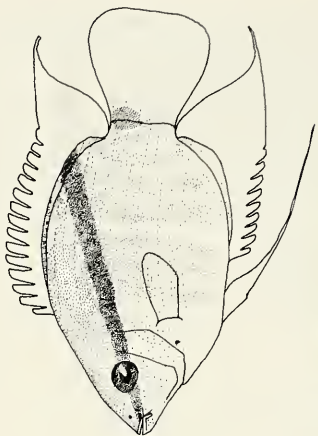
C *Mesonauta festivus*



D *Mesonauta acora*



E *Mesonauta egregius*



F *Mesonauta mirificus*

Bar 2 – across the caudal peduncle.

Bar 3 – between the posterior rays of the dorsal and anal fins, and usually covering the root of the caudal peduncle.

Bar 4 – between the soft dorsal and anal fins.

Bar 5 – between the spinous anal fin and posterior part of the spinous dorsal fin.

Bar 6 – across the side above the vent; in *Mesonauta*, with a long forwards extended anal fin, this bar is above the first two spines of the anal fin.

Bar 7 – across the side above the abdomen, slightly posterior to a vertical from the pelvic fin insertion.

Bar 8 – down from the nape or anterior spines of the dorsal fin to the gill cover or down on the side immediately posterior to the gill cover. This bar is always indistinct in *Mesonauta*, expressed chiefly by the first blotch in the lateral band behind the head.

The basic pattern is found in *Tahuantinsuyoa* Kullander (1986, pl. XXXIV, fig. 1), *Bujurquina* Kullander (1986, pls. XXIV-XXXIII, with obvious variation), *Laetacara* Kullander (1986, pl. XXXIV, figs 2-3, pl. XXXV, fig. 1, bar 1 may be absent), *Krobia* Kullander & Nijssen (1989, figs. 80-81, 92), and '*Cichlasoma*' *facetum* (Jenyns) (STEINDACHNER 1869, Taf. II, as *Heros Jenynsii*; STAWIKOWSKI & WERNER 1989, p. 89) and *Nannacara* Regan (KULLANDER & NIJSSEN 1989, figs 122-123), but we note that in many the anterior bars are not distinct. (In this comparison we refer to representative published figures, but we examined several specimens of each taxon.)

Cichlasoma species mostly have one more body bar. In KULLANDER (1983, fig. 4), bars shown as Bars 4 and 5 correspond in position to a split of bar 5 in the basic cichlasomine pattern. *Cichlasoma paranaense* Kullander and *C. sanctifranciscense* Kullander, however, have the basic pattern.

In *Aequidens* Eigenmann & Bray, the vertical bars are commonly indistinct, but the basic pattern can be observed in *Aequidens plagiozonatus* Kullander (1984). In *A. paloemeuensis* Kullander & Nijssen (1989, fig. 77) the number is definitely reduced, probably by union of two bars.

In the extremely deep-bodied *Symphysodon* (KULLANDER 1986, pl. XXV), with extremely long soft anal and dorsal fins, there is no vertical bar on the caudal peduncle, which may correlate with the extremely short caudal peduncle. Between the soft dorsal and anal fins run two rather than one vertical bar and we hypothesize a doubling of bar 4 in relation to extreme elongation of the soft vertical fins. Comparing with *Heros* (KULLANDER 1986, p. XXXIV, fig. 1), which shows bar 2 at the extreme rear of the caudal peduncle and a separate caudal spot (bar 1), it seems like the posteriormost bar in *Symphysodon* may equal united bars 1 and 2; but in *Heros*, with 7 bars anterior to bar 1+2 like *Symphysodon*, the soft anal fin is not particularly long.

Hoplarchus Kaup seems to conform to the basic pattern (STAWIKOWSKI & WERNER 1989, p. 43). *Pterophyllum leopoldi* Gosse (STAWIKOWSKI & WERNER 1989, p. 50) conforms except for modification of bars 3 and 4 into a single wide bar at the root of the caudal peduncle. In *P. altum* Pellegrin and *P. scalare* (Lichtenstein) (KULLANDER 1986, pl. XXIII) homologization of the anterior bars is more problematic as the pattern is strongly modified.

In *Hypselecara* Kullander (1986, pl. XXVII) the pattern discernible in some specimens is quite subtle and complex. Also *Uaru* escapes ready comparison, having what seems to be a highly apomorphic colour pattern which changes drastically during ontogeny. *Cleithracara* Kullander & Nijssen has no vertical bar pattern that can be analyzed.

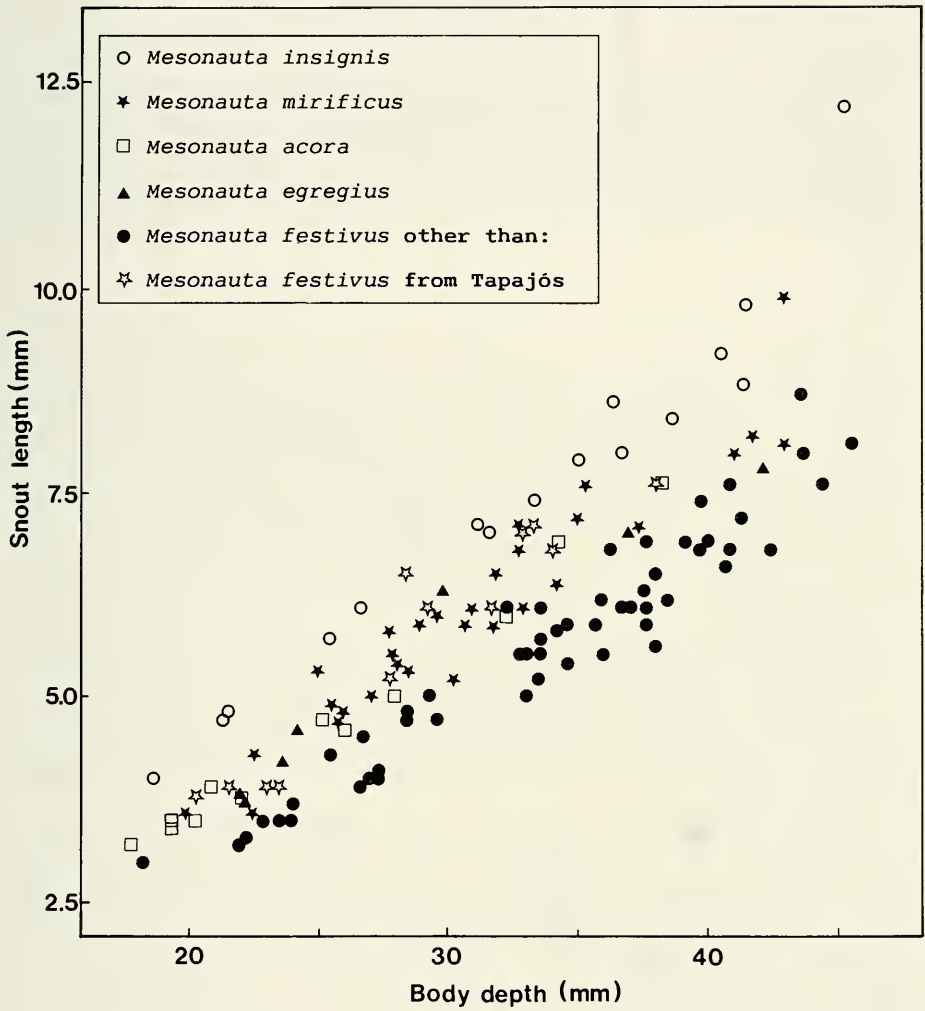


FIG. 2.

Snout length plotted against body depth in *Mesonauta* species to show scatter with extremes in *M. insignis* (long snout, elongate body) and southern populations of *M. festivus*.

The basic pattern and bar numbers referred to here seem to correspond with those recognized for the Central American cichlasomine *Herotilapia multispinosa* (Günther) by BAYLIS (1974, fig. 1: 'Dorsal bars' 1-8). We did not examine that species, and we leave Central American and Pacific Coast cichlasomines and *Caquetaia* Fowler for future

address. We note that in at least some geophagines the pattern of vertical bars may correspond to the basic pattern, e.g., *Apistogramma* Regan (KULLANDER 1980).

ETYMOLOGY

The name *Mesonauta* was not explained by GÜNTHER (1862). It is probably composed of the Greek words *mesos*, middle or average, and *nautes*, sailor, alternatively the second word is the Latin *nauta*, sailor. The gender is masculine. The meaning of the composite is not obvious, but likely the name in some respect refers to the position of the dorsal fin origin posterior to the pelvic fin origin which was Günther's principal diagnostic character.

DISTRIBUTION

Mesonauta species have been collected in the Orinoco, the middle and upper Paraguay basin, most of the Brazilian and Peruvian Amazon basin (below lowermost falls except in the Xingu, the Jamari and perhaps the Araguaia), the Bolivian Amazon, Guyana and Amapá. The present review does not have full geographic coverage of the genus (Fig. 10), and thus we leave a biogeographic analysis aside. It should be emphasized, however, that sympatric occurrence of two congeneric species, which we report for *M. mirificus*, *M. festivus* and *M. acora*, especially when they are closely related and externally very similar, is a very unusual phenomenon among South American cichlids. Also the geographic ranges of *M. festivus*, *M. acora* and *M. insignis*, which each span two separate river drainages, are notable.

Other cichlid species have been reported to occur both in the upper Rio Negro and Rio Orinoco (e.g. KULLANDER & FERREIRA 1988: *Satanoperca daemon* Heckel), and the distribution of *M. insignis* pertains thus to a more general pattern.

Cichlasoma araguaiense Kullander (1983) also occurs in both the Xingu and Tocantins drainages, but not elsewhere, and is thus similar to *M. acora* in distribution, but no other cichlid species has so far been recorded as occurring exclusively in the Tocantins and Xingu drainages.

Astronotus crassipinnis (Heckel) and *Satanoperca pappaterra* (Heckel) are restricted to the Bolivian Amazon and Paraguay drainages (KULLANDER 1986), and recent collections indicate the same for *Aequidens plagiozonatus* (unpubl.). Occurrence of *M. festivus* in both the Paraguay and Bolivian Amazon drainages thus reflects a more general pattern, which is of particular interest because there is no present interconnection between the Amazon and Paraguay basins. The range extension of *M. festivus* into the central Amazon basin (Rio Tapajós) is noteworthy and marks a unique distribution for the species. Since the species also occurs in the Jamari, it is perhaps more widely distributed along the western and northwestern margin of the Brazilian highlands, however.

On the whole, *Mesonauta* species seem to have diversified by allopatric speciation; notably the sympatric occurrences are in the lowland Amazon, which has undergone the most dramatic hydrographic changes since the reversal of the Amazon outlet in the late Tertiary, and which area is most likely to have a fauna of mixed origin.

KEY TO *Mesonauta* SPECIES

- 1 Microbranchiospines on all four gill arches 2
- Microbranchiospines on three posterior gill arches only 3
- 2 Preoperculum scaled (2-4 scales); bar 5 divided *M. achora*
- Preoperculum naked, or a single scale; bar 5 integer *M. festivus*
- 3 Bar 6 divided, upper part joining bar 7, lower part joining bar 5. *M. insignis*
- Bars 6 and 7 parallel, bar 6 split vertically 4
- 4 Anal fin spines 6-7 *M. egregius*
- Anal fin spines 8-9 *M. mirificus*

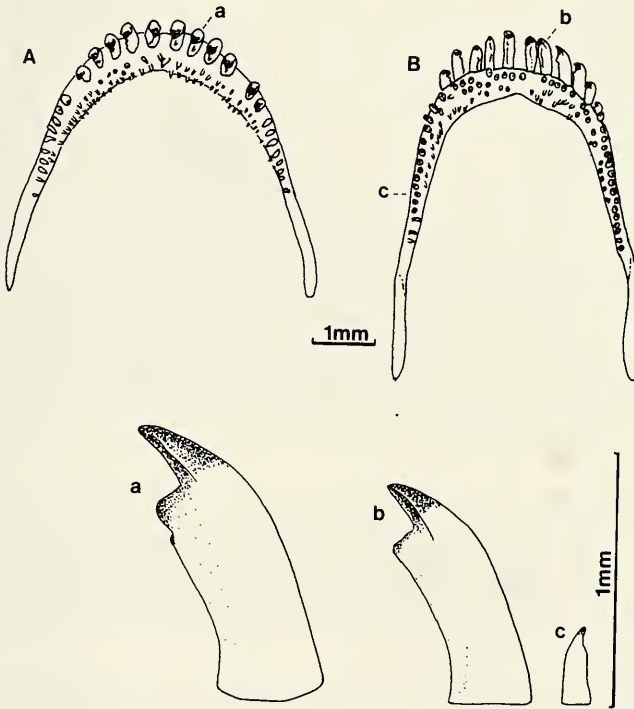


FIG. 3.

Mesonauta mirificus. A upper and B lower jaw dentition in occlusal aspect and a-c teeth in lateral aspect, NRM 23769, 65.0 mm SL. From KULLANDER (1986, fig. 71).

Mesonauta insignis (Heckel)
(Figs 1B, 2, 6, 10-12; Tables 1-6)

Bibliography:

Heros insignis Heckel, 1840, p. 379 (original description; Waldlache bei Marabitanas am Rio-negro).

Lectotype: NMW 24415. Adult, probably male, 93.7 mm SL. Brazil, Estado do Amazonas, 'Rio negro' [Marabitanas]. No date. Collected by J. Natterer.

Diagnosis: Distinguished from all other *Mesonauta* by having the middle part of bar 6 merged with bar 7, sometimes partially separated by a light vertical stripe, and the ventral part of bar 6 normally united with bar 5. The reticulate pattern of the back and nape separates from all other *Mesonauta* species but may be indistinct. *Mesonauta insignis* is also more slender and has longer snout than other *Mesonauta* species (Table 1, Fig. 2).

Material examined: The syntypes and 92 non-types, 18.5-93.7 mm.

Description: Counts in Tables 2-5. Measurements in Table 6, see also Table 1 and Fig. 2. Comparatively elongate. Snout long, pointed. Predorsal contour straight. Scales in transverse row 12+1+4 $\frac{1}{2}$. No preopercular scales. Cheek scale rows 3(29), 4(1). Soft dorsal and anal fins pointed, reaching at most slightly beyond caudal fin. Pectoral fin rays 11(28), 12(2). Pelvic fin reaching at most to middle of caudal fin, length 72.6-89.6%SL in five Negro specimens, 60.7-87.6%SL in 11 Orinoco specimens. Teeth 9-17 in upper jaw outer hemiseries, 11-20 in lower jaw outer hemiseries; two inner rows in both jaws, except in some specimens <40 mm with one inner row only. Microbranchiospines externally on three posterior gill arches. Lower pharyngeal tooth plate (Fig. 6) in three Orinocoan specimens (71.4-82.5 mm, USNM 269335) wide (length 77-84% of width, dentigerous area length 72-79% of width); all teeth distinctly bicuspid with long antrorse posterior cusp and smaller rostral cusp. 22-28 in posterior row, 7-8 along middle. Ceratobranchial 4 with three tooth plates with 7-17, 8-9 and 2-8 teeth, respectively.

Colour pattern. The nape and the back above the lateral band with a dark reticulated pattern formed by pigment bordering the exposed part of each scale, commonly not distinctly expressed in young specimens. The vertical bars are relatively indistinct in upper Rio Negro specimens (Fig. 11), better expressed in specimens from the middle Rio Orinoco (Fig. 12).

Bars 6 and 7 form a single wide bar which gradually narrower ventrally, not quite reaching to the abdominal margin. Evidently, bar 6 is divided below the midline of the side, whereby the dorsal portion joins bar 7 and the ventral portion joins bar 5; this is obvious in occasional Orinocoan specimens in which the ventral portion remains separate from bar 5. Bar 5 is divided close to the anal fin base; bars 2-5 are largely contiguous, separated only close to the anal fin base. A light spot at the anterior termination of the lower lateral line.

The lateral band is intensely pigmented, with a distinct light ventral border, and extends to the tip of the soft dorsal fin; blotches contained in the band are more evident in Orinocoan than in Rio Negro material.

The dorsal, caudal and anal fins are more or less distinctly spotted, rarely immaculate.

Variation: Only few adult or even subadult specimens are available from the upper Rio Negro. In comparison with material from the middle Rio Orinoco, the Rio Negro material can be characterized by relatively indistinct vertical bars and rather even lateral band pigmentation. They also appear fairly slender and with more acute snouts, but proportional measurements fail to bring out any discrete differences except that Rio Negro

specimens 51.9-93.7 mm SL have a narrower head (17.5-17.9%SL) than Orinocoan specimens 52.0-82.5 mm SL (18.1-19.1%SL). Orinocoan *M. insignis* average more E1 scales and gill rakers than Rio Negro specimens (Table 2).

Specimens from the middle Orinoco are very variable individually in the pattern of postabdominal bars. Occasional specimens have a short light stripe nearly dividing the combined abdominal bars. Several middle Orinoco specimens have a blotchy lateral band.

Distribution: Upper Rio Negro, and along the Rio Orinoco (Fig. 10).

Etymology: The species epithet is a Latin adjective meaning distinguished, remarkable, etc.

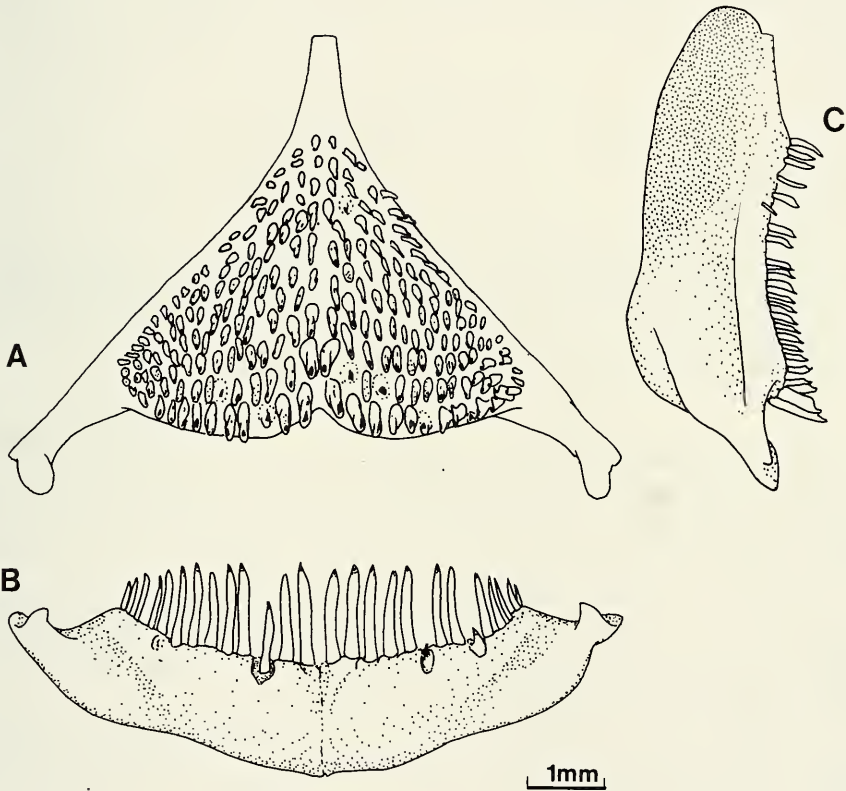


FIG. 4.

Mesonauta festivus. Lower pharyngeal tooth-plate in **A** occlusal, **B** caudal, and **C** lateral aspect. NRM 23772, 66.9 mm SL.

Notes: HECKEL (1840) based his description on specimens collected by Natterer in a forest lake at Marabitanas, upper Rio Negro. He refers to 'Exemplaren' in the colour description but ends the description with the singular: 'Länge des beschriebenen Exemplars: 5 Zoll'. There are three specimens preserved in NMW, 52.3-94.8 mm SL, labeled as coming from the Rio Negro and collected by Natterer. The largest specimen is likely identical with the 5 inch specimen mentioned by Heckel, the others were maybe used only for the colour description. Although now faded, the largest specimen (NMW 24415) appears adequately described by Heckel. It is here designated as lectotype of *Heros insignis*. The other two specimens (NMW 24416-24417) thus become paralectotypes.

Mesonauta insignis is the most long snouted and slender bodied of the *Mesonauta* species (Fig. 2). It is characterized above all by the pattern of bars 5-7, whereby it seems like bar 6 is divided in an upper section uniting with bar 7 and a ventral section combining with bar 5. The reticulated pattern on the back is unique to this species, but is not always so emphasized as in the specimens on Figs 1B and 11. The species also has an average higher dorsal count than other *Mesonauta* totalling modally 27 rather than 26 (Table 4).

***Mesonauta festivus* (Heckel)**

(Figs 1C, 2, 4, 7, 10, 13-17, Tables 1-5, 7-8)

Bibliography:

Heros festivus Heckel, 1840, p. 376 (original description; Fluss Guaporè und dessen nahe gelegenen Moräste).

Mesonauta festivus; EIGENMANN & KENNEDY 1903, p. 535 (listed; Laguna near Arroyo Trementina). – EIGENMANN *et al.* 1907, p. 145, pl. XLV, fig. 1 (listed; Corumba; monochrome photo). – KULLANDER 1986, p. 206, figs 73-74, pl. XXIII, fig. 4, tab. 18 (description; Madre de Dios; monochrome photo).

Mesonauta festivum; PEARSON 1925, p. 53 (listed; Lagoons near Reyes).

H o l o t y p e: Not located.

D i a g n o s i s: Distinguished from other *Mesonauta* by averaging deeper body and shorter snout (Fig. 2), but there is geographic variation (Fig. 17). It differs from all except *M. acora* by having microbranchiospines externally on all four gill arches. There are five vertical bars: bars 6 and 7 are separate, bars 3 and 4 are united except close to anal fin. The preopercle is rarely scaled unlike in *M. acora* in which it is invariably scaled, and bar 5 is not interrupted as in that species.

M a t e r i a l e x a m i n e d: No type material was available to us. We examined comparatively series from the Guaporé, Paraguay, Madre de Dios and Tapajós drainages and also include cursorily examined material from the Rio Jamari, Rio Beni, and Rio Mamoré, to a total of 448 specimens, 8.5-115.7 mm SL.

D e s c r i p t i o n: Counts in Tables 2-5. Measurements in Tables 7-8, see also Figs 2 and 17. Material from the Guaporé, Paraguay and Madre de Dios is all very similar; specimens from the Tapajós drainage were found to differ slightly from the rest and are hence discussed separately.

Depth of body variable, but generally very deep. Snout moderately long, rounded. Predorsal contour straight or slightly convex. Scales in transverse row usually 13+1+4 1/2, occasionally 12 or 14 below lateral line. Preopercle usually without scales; one scale in a Madre de Dios specimen, two scales in two Guaporéan specimens. Cheek scale rows 3(50), 4(5). Soft dorsal fin pointed, generally not beyond 3/4 of caudal fin, but may reach beyond caudal fin hind margin. Anal fin pointed, reaching at most slightly beyond caudal

fin. Pectoral fin rays 10(2), 11(49), 12(4). Pelvic fin reaching at most to middle of caudal fin, length 45.5-104.4%SL in 24 Peruvian, 53.2-94.8%SL in 16 Paraguayan, 58.1-85.5%SL in 12 Guaporéan specimens. Teeth 9-15/8-18; two inner rows anteriorly in each jaw. Microbranchiospines externally on all four gill arches, often also internally on fourth arch. Lower pharyngeal tooth plate (Fig. 4) wide, length 81% of width in a Guaporéan specimen 62.7 mm, 77% in Madre de Dios specimen figured (66.9 mm SL), 74% in a Paraguayan specimen 66.2 mm SL, dentigerous area length 72%, 73% and 78% in the same specimens. Teeth laterally compressed, anterior with bevelled cusp, posterior with posterior cusp and anterior bulge but no sharp anterior cusp. Teeth in posterior row, 26, 27, 27, teeth along median 8, 9, 8-9 in Guaporé, Madre de Dios and Paraguayan specimens. Ceratobranchial 4 tooth-plates and teeth on each (postero-anterior succession): Guaporéan specimen three with 6,8 and 5 teeth; Madre de Dios specimen two with 6 and 22 teeth; Paraguayan specimen one with 16 teeth.

Colour pattern: There are no dark margins to the scales on the back. The sides of the chest are usually dusky.

The vertical bars are distinct: bar 7 slightly posterior to a vertical from the pelvic spine; bar 6 above the first two anal spines, slightly narrower on the abdominal sides than above; bar 5 above the middle of the spinous anal fin; bars 3 and 4, above the soft anal fin, are united for most of their length, distinctly divided only ventrally, but may split also dorsally; bar 2 on the caudal peduncle. Bars 2-5 are more or less continuous along the middle of side, and sometimes also bars 6 and 7 are connected to the others along the middle of the side. Bar 5 and bar 3+4 divisions extend onto the anal fin base.

The lateral band is made up of more or less confluent blotches, one in the posttemporal area, one in bar 7, one in bar 6, and one generally less prominent from bar 5 back onto the dorsal fin base; the continuation on the dorsal fin is faint. Light spots above and below the band between blotches.

The unpaired fins are usually indistinctly spotted, especially as both the caudal and anal fins are often dark, nearly black.

Mesonauta festivus from the Rio Tapajós. We examined several lots of *Mesonauta* from the lower Tapajós at Santarém and Aveiro. One of these species is identified provisionally as *M. festivus*. The Tapajós *M. festivus* may represent an additional species but since we can only distinguish specimens over 50 mm with any confidence, we judge that available information only permits recognition of a diagnosable population, and we need more collections to ascertain the taxonomic standing of this geographic variation.

The Tapajós population has microbranchiospines externally on all four gill arches, and the same body colour pattern as other *M. festivus*: vertical bars five, of which bars 6 and 7 distinct, bars 2-5 more or less confluent, bars 3 and 4 united except close to anal fin. It differs from other *M. festivus* in being more slender, body depth 47.8-52.6% of SL instead of 52.9-61.1% of SL in specimens over 60 mm, in averaging 9 rather than 8 anal spines (Table 4) and 12 rather than 13 abdominal vertebrae (Table 5), and in having always distinct hyaline spots on caudal and anal fin. Scales in transverse row 12+1+4-4 1/2. No preopercular scales. Cheek scale rows 3(12). Pectoral fin rays 10(1), 11(11). Pelvic fin length 41.1-78.4%SL in 11 specimens. Teeth 9-15 in upper jaw outer hemiseries, 11-18 in lower jaw outer hemiseries; two inner rows in both jaws. The lower pharyngeal tooth plate was examined in three specimens and is perhaps more elongate in the Tapajós form than in other *M. festivus*: In 66.9 mm specimen length 87% of width (length of dentigerous area 76% of its width); teeth without distinct anterior cusp; teeth in

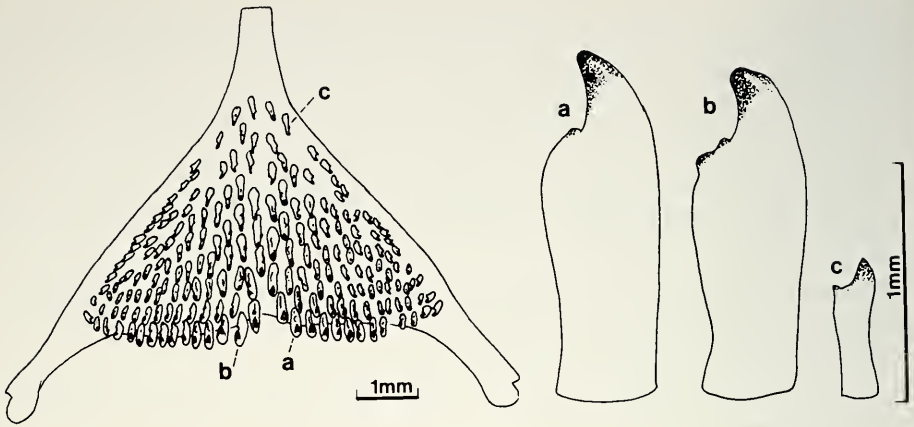


Fig. 5.

Mesonauta mirificus. Lower pharyngeal tooth plate in occlusal aspect and teeth in lateral or medial aspect. NRM 23771, 78.3 mm SL. Modified from KULLANDER (1986, fig. 72).

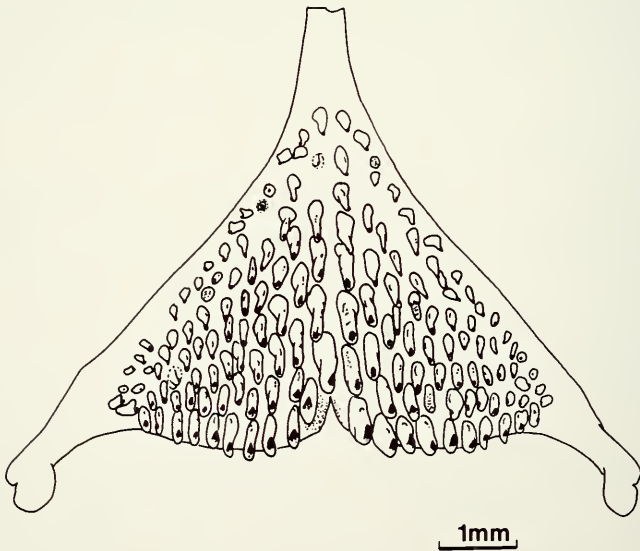


FIG. 6.

Mesonauta insignis. Lower pharyngeal tooth plate in occlusal aspect. USNM 269335, 71.4 mm SL.

posterior row 25, along middle 7-8; many teeth strongly abraded (Fig. 7). In 44.5 mm specimen plate length 78% of width (dentigerous area length 76% of width), teeth in posterior row 25, in median row 6-7. In 58.1 mm specimen length 77% of width (dentigerous area length 80% of width), teeth in posterior row 23, in median row 8. Ceratobranchial 4 in 66.9 mm specimen with four tooth plates with (in posteroanterior succession) 1, 4, 5, and 0 teeth.

Distribution: Bolivian Amazonia, including the Madre de Dios in Peru, and the Guaporé-Mamoré drainage, the Paraguay drainage, Rio Jamari and lower Rio Tapajós (Fig. 10).

Habitats: Tapajós NRM specimens were taken from a sandy shore at Aveiro and a small creek at Santarém, close to vegetation and with mud and sand bottom. Vila Bela da Santíssima Trindade NRM specimens were seined in the shadow of the ferry, in shallow water with much aquatic vegetation. In Madre de Dios one sample was seined from a pool in a stream with clear, slightly tinted water and no vegetation; another, mixed sample came from a small stream and nearby cattle pool (KULLANDER 1986, p. 208).

Etymology: The species epithet is a Latin adjective meaning merry, handsome, etc.

Local name: "Acarà Bandeira" (Vila Bela de Santíssima Trindade; NATTERER in HECKEL (1840)).

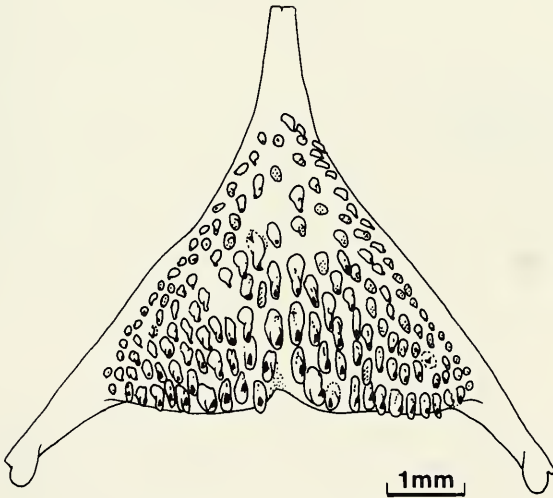


FIG. 7.

Mesonauta festivus. Tapajós population. Lower pharyngeal tooth plate in occlusal aspect. MZUSP 8507, 66.9 mm SL. The tooth plate shown is slightly more elongate than in two other specimens of the same population.

N o t e s : *Mesonauta festivus*, excepting the Tapajós population, is the most deep bodied and short snouted species of the genus (Fig. 2 and Table 1), but the colour pattern is more useful for separating the species from others as there is some overlap in ranges of body proportions. The only other species with microbranchiospines on all four gill arches, *M. acora*, has always scaled preopercle and divided instead of complete bar 5.

The Madre de Dios specimens average one vertebra less than the Paraguayan and Guaporéan samples (Table 5), in other respects Paraguayan, Guaporéan and Madre de Dios material is very similar. The bar pattern seems to be most contrasted in Paraguayan specimens, and only Madre de Dios specimens have a lateral band nearly of uniform intensity. Tapajós material differs from the rest as indicated above.

The localization of central Amazonian *M. festivus* to the lower Rio Tapajós may very well be an artifact of the available material, and we hesitate to consider it a disjunct population. Most *Mesonauta* samples from the Tapajós included specimens of one more *Mesonauta* species in which the vertical bars above the anal fin are discrete and the pattern of light blotches along the anal fin base is never present; the lateral band is more continuous and the scales on the back are dark spotted.

The description of *M. festivus* is based on a specimen said to be 5 inches long (TL) and a drawing showing live colours. Neither is to be found in NMW. The locality, Rio Guaporé (probably Vila Bela as indicated by the reference to the vernacular name on p. 376: 'Acarà Bandeira, in Matogrosso'), and the description unambiguously referring to a *Mesonauta* species strongly indicate to which species the name belongs, as there is only one *Mesonauta* species known from the upper Rio Guaporé.

The description of the colour pattern does not concord with anything known from the genus, however. Four vertical bars are referred to: one 'beginning before the dorsal fin and extending only to the beginning of the gill cleft, the second below the 5th-6th ray of the dorsal fin runs close behind the insertion of the pelvic fins [bar 7] and the two following are situated between the spinous rays of the dorsal and anal fins [bars 6 and 5]; between the soft-rayed parts of these two fins the body like the tail has the colour of the bars'. Possibly the interspaces between the posterior bars were not apparent, although in our material of *M. festivus* the bar pattern, also above the anal fin, is quite distinct.

KULLANDER (1986) noted that in *M. festivus* from the Madre de Dios drainage, there is a distinct angle in the course of the lateral band (Fig. 15). We find this angle pronounced in Madre de Dios material, perhaps correlated with the shorter vertebral column, but subtle or not present in specimens from elsewhere (Figs 13, 14, 16).

***Mesonauta acora* (Castelnaud)**
(Figs 1D, 2, 8, 10, 18-20, Tables 1-5, 9)

Bibliography : *Chromys?? acora* Castelnaud, 1855, p. 17, pl. 9, fig. 1 (lacs de l'Araguay; holotype not preserved).

T y p e s e r i e s : Nonexistent, the description apparently based on a drawing made in the field.

D i a g n o s i s : Distinguished from all other *Mesonauta* species by the invariable presence of two to four, usually three scales on the preopercle (Fig. 18). Similar only to *M. festivus* in having microbranchiospines externally on all four gill arches. The colour pattern is more irregular than in other *Mesonauta* species; most distinctive is the light stripe from the anterior termination of the lower lateral line which runs obliquely forward and downward to the light interspace between bar 6 and the irregular field of

postabdominal bars. This pattern is found also in young of *M. egregius*, which differ in having a divided instead of integer bar 6.

Material examined: Twenty-eight specimens, 20.1-70.5 mm. Most specimens are fairly small, but in good condition. Three of the largest specimens, 52.2-70.5 mm, are not well preserved with regard especially to colour pattern.

Description: Counts in Tables 2-5. Measurements in Table 9, see also Fig. 2. Moderately deep. Snout moderately long, rounded. Predorsal contour straight in young, slightly curved in large specimens. Scales in transverse row 11+1+4 in specimens smaller than 50.0 mm, 12+1+4-4 $\frac{1}{2}$ in specimens larger. Preopercle with 2-4 scales, usually one ventrally on vertical limb, one between corner pores and one on horizontal limb (Fig. 18). Cheek scale rows 3(12). Soft dorsal fin pointed, reaching at most to 3/4 of caudal fin. Anal fin pointed, reaching at most to slightly beyond caudal fin. Pectoral fin rays 10(3), 11(9). Pelvic fin reaching at most to base of caudal fin, length 40.8-59.2%SL in 9 Xingu specimens, 57.3%SL in 59.3 mm Tocantins specimen. Teeth 7-11 in upper jaw, 12-17 in lower jaw, one inner row in upper jaw in young (<50 mm), two in large specimens, two inner rows in lower jaw. Microbranchiospines present externally on all four gill arches from 20.1 mm SL (smallest available specimen). Lower pharyngeal tooth plate in 53.2 mm

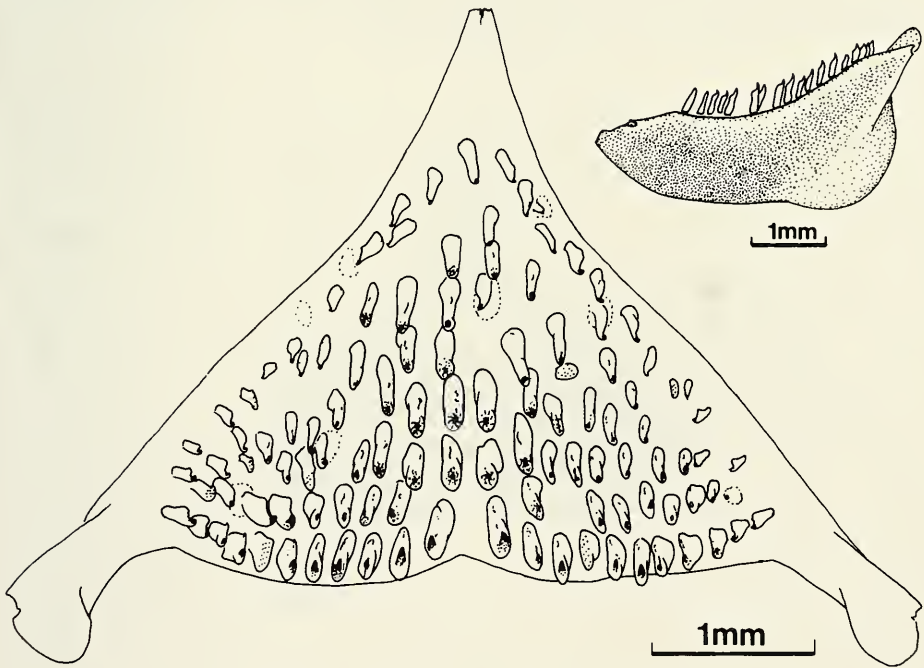


FIG. 8.

Mesonauta acora. Lower pharyngeal tooth plate in occlusal and lateral aspect. NRM 14605, 52.2 mm SL.

specimen (Fig. 8) wide, length 67% of width, length of dentigerous area 71% of its width; teeth slender, compressed, those posteriorly bicuspid, anterior cusp gradually more reduced anteriorly; teeth 22 in posterior row, 7 along median. Ceratobranchial 4 with two tooth plates with 15 and 4 teeth respectively.

Colour pattern: The scales of the back are without dark margins. Usually a brown blotch on the chest below the subopercle. The opercle and subopercle are brownish. The pectoral axilla has some brown pigment. There seems to be no significant change in body colour pattern from young to adult.

A dark bar runs from the supracleithrum dorsally to the origin of the dorsal fin, sometimes indicated also above the pectoral axilla. Bar 7 extends straight down to the base of the soft part of the pelvic fin; bar 6 extends straight down to the bases of the first and second anal spines. The vertical bars posterior to bars 6 and 7 form a mottled pattern as bar 5 is interrupted on the middle and all bars are more or less contiguous; viewed as a dark field with light markings the mottled pattern may be described as follows:

Two large light blotches close to the anal fin base and one smaller light blotch close to the end of the anal fin base. A light spot on the middle of the lower lateral line, and a light stripe obliquely forward and downward from the anterior end of the lower lateral line to the light field posterior to bar 6. A light spot on the dorsal margin of the caudal peduncle, adjacent to the dark blotch at the base of the dorsal fin (see below) and at the end of the upper lateral line. The anterior vertical bars continue above the lateral band, where less contrasted due to the countershading of the back. There is a variable number of small dark spots in the light areas close to bars 6 and 7.

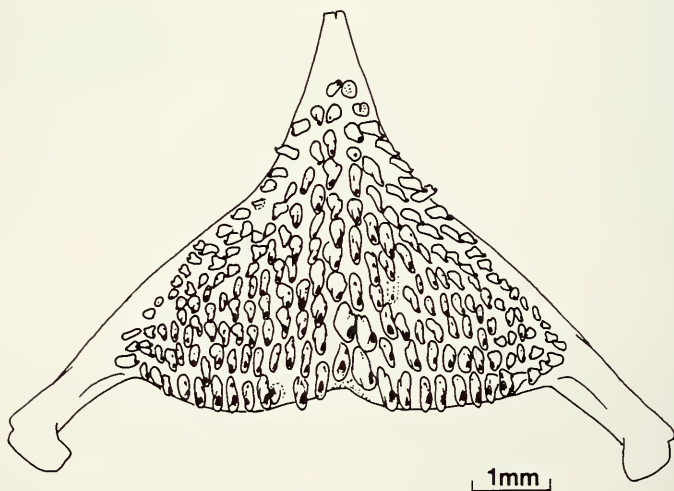


FIG. 9.

Mesonauta egregius. Lower pharyngeal tooth plate in occlusal aspect. NRM 11302, 67.1 mm SL.

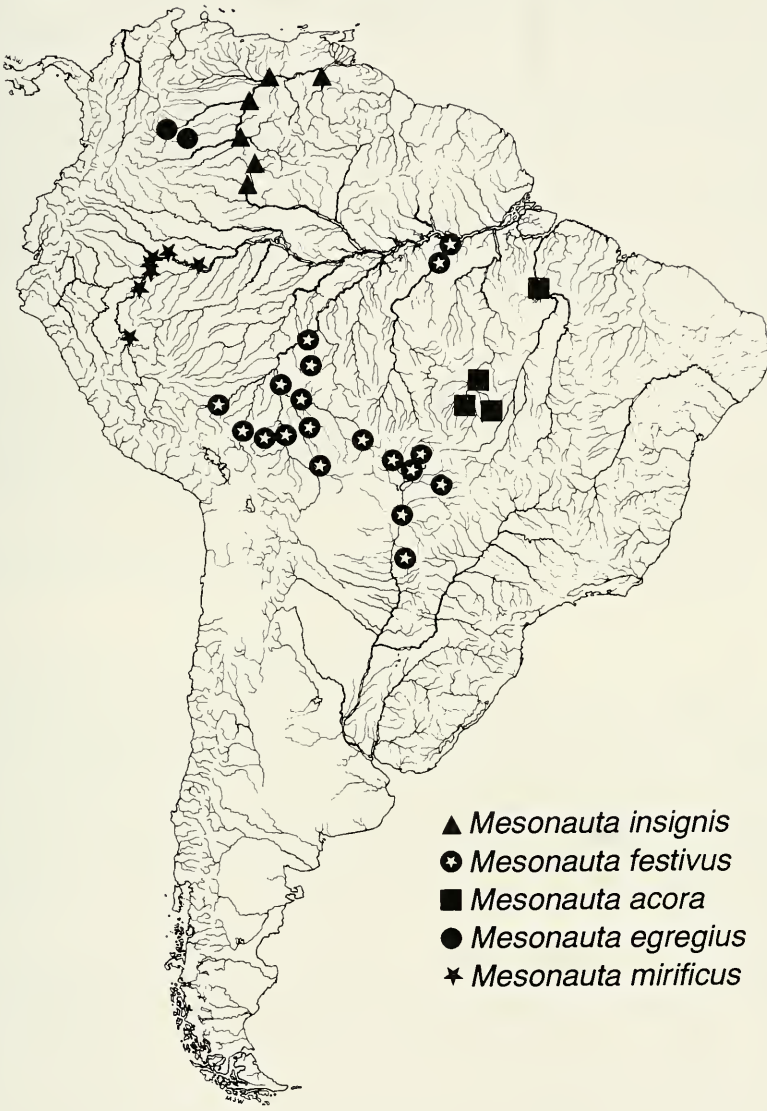


FIG. 10.

Collecting localities of *Mesonauta* species: *Mesonauta insignis*, *M. festivus*, *M. acora*, *M. egregius* and *M. mirificus*. One symbol may cover more than one collecting site.

The lateral band runs to the anterior one-third of the soft dorsal fin on which it fades out. Intensely pigmented dark blotches form where the band crosses vertical bars: one immediately posterior to the head, three along the side and one at the junction of the body and the dorsal fin. Light spots form along the dorsal margin of the band between the dark blotches.

The dorsal fin is spotted. The anal fin is smoky with dark ventral margin and adjacent dark pigment on body continues over the basal part of the fin; a few light dots on the posterior 1-3 interradial membranes. The caudal fin base is brownish with a light spot proximally on the ventral lobe, the rest of the fin greyish with darker margin and light spots in vertical rows proximally on the ventral lobe and on the entire dorsal lobe.

Live colours: A photo of a fresh caught specimen (probably NRM 14605, 70.5 mm SL) shows a fish similar to the preserved, with white or silvery ground, lateral band black, other dark markings grey.

Distribution: Upper Rio Xingu and lower Rio Tocantins, probably also Rio Araguaia (Fig. 10).

Ecology: WERNER (1990, pp. 55-58) briefly described and figured the habitat of *Mesonauta acora* from a small stream south of São José do Xingu (NRM 14605). It was noted as a narrow blackwater creek widening at the collecting site and in places 1 m deep. The bottom substrate was sand and mud in part with dense stands of aquatic plants. The temperature was 22°C, pH 5.5, conductivity 5 µS. The *Mesonauta* were taken from quiet shore areas with reed and grass.

CASTELNAU (1855) wrote that the species comes from the lakes of the Araguaia: 'It lives at the surface of the water, among tall grasses, and rests lying on its side; when it is disturbed it dashes into the air by prolonged jumps.' (Translation.)

Etymology: *acora*: «Les sauvages le désignent sous le nom d'Acora» (CASTELNAU 1855, p. 17). "Acora" is likely an orthographic variant of "acará", the Tupi-Guarani name for cichlids. Since 'acora' is used as the local name in the description and as species epithet in the head of the description, in the 'Liste des Poissons...' (p. 108), in the list of plates (p. XI), and in the legend of the plate (pl. 9), the orthography can hardly be a printer's error. There is no indication elsewhere in CASTELNAU (1855) that it would be a misspelling. In fact there are two more local names cited, 'Carao' (p. 13) and 'Wacara' (p. 16) that obviously correspond to Acará as others would have written. It is obvious that the transliteration is original and there is thus no ground for correcting the spelling to that usually found in lexica (INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE 1985, Art. 32c, ii).

Notes: Castelnau seems not to have preserved any specimens of *Chromys acora*. He only refers to a drawing made in the field, and in the description of *Chromys fasciata* (p. 17) he notes with reference to that species that he only had a very imperfect drawing because the specimens were lost together with almost all of the collections from the Araguaia. Therefore the diagnostic characters of *Chromys acora* have to be extracted from the description and figure, both very crude. It is not stated whether the 44 mm TL long drawing is natural size, but it very likely is because it is so very small in comparison to most other drawings in CASTELNAU (1855). We suspect also that the description is based on the field sketch alone since only form and colours are described. The illustration in CASTELNAU is probably copied from the field drawing but the apparent imperfections in this rendering are probably taken over from the original because Oudart, the artist of the published illustrations, in his other work appears to have been a meticulous observer. The outline of the body and the long pelvic fin immediately place the fish as a *Mesonauta*. The general colour pattern, with the oblique lateral band, also suggest this genus. The caudal

and anal fins are shown and described with broad stripes and the anal fin with a violet black blotch, which are marks not expected in a *Mesonauta* and were probably incorrectly interpreted in the field. With respect to species diagnostic characters, we note particularly the mottled pattern of the side, with two vertical bars across the anterior sides and two light spots close to the anal fin base, and particularly the open space along the middle of the posterior sides, which indicate the *Mesonauta* species in the Tocantins and Xingu.

No *Mesonauta* has since been reported from the Rio Araguaia, where Castelnau says he observed the fish and made the drawing.

No neotype is proposed herein for two reasons. First, no preserved *Mesonauta* specimens are available from the Rio Araguaia (type locality) and which it would be desirable to study before fixing the name on any particular geographic population. Second, there exists a figure and a description of the lost holotype (INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE 1985, Art. 72c, v) which are sufficiently detailed to permit recognition of one particular species among the *Mesonauta* species currently distinguished.

Counts of *M. acora* (Tables 2-5) are distinctive with regard to the high frequency of A. VIII.11, which is unusual in the genus. The snout length: body depth ratio is notably intermediate between the extreme values for the genus (Fig. 2).

We have examined *Mesonauta* specimens (NRM 14606) from Altamira on the lower Xingu which are clearly different from *M. acora* especially in having a pattern of discrete regularly arranged vertical bars, in lacking preopercular scales and in having microbranchiospines on the posterior three gill arches only. In the lower Tocantins, *M. acora* is sympatric with another *Mesonauta* species readily separated by its naked preopercle.

***Mesonauta egregius* new species**
(Figs 1E, 9-10, 21, Tables 1-5, 10)

H o l o t y p e : ICN-MHN 1686. Young female, 57.2 mm SL. Colombia, Departamento Vichada, Rio Vichada drainage, laguna no. 1 on Finca Boca de Guarrojo at the mouth of the Rio Guarrojo. 8 March 1972. Collected by T. Hongslo (field no. VIT 63).

D i a g n o s i s : Distinguished in particular by lower metameric meristics than other *Mesonauta* species: dorsal fin count usually XIV.11 instead of XV.10-11, anal fin count usually VII.11 which is not found in other *Mesonauta* species, E1 row scales usually 24 instead of 25 or 26, vertebrae 13+13 instead of 12+14 or 13+14. Bar 6 is split ventrally, but unlike in *M. mirificus* with similar pattern, there are no horizontal stripes along the sides. It is distinguished from the geographically close *M. insignis* also by deeper body (50.7-55.6%SL vs 47.6-53.4%SL) and shorter snout (8.9-11.0% vs 10.2-13.0%SL), and by having plain coloured instead of reticulated dorsal pigment pattern.

M a t e r i a l e x a m i n e d : Holotype and 12 paratypes, 15.3-75.9 mm.

D e s c r i p t i o n : Counts in Tables 2-5. Measurements in Table 10, see also Fig. 2. Deep. Snout short, rounded. Predorsal contour ascending with distinct bend above orbit. Scales in transverse row 12+1+4 $\frac{1}{2}$. Cheek scale rows 3(7). Soft dorsal fin with rounded tip, reaching at most to middle of caudal fin; anal fin with long, wide point reaching to end of caudal fin or slightly beyond. Pectoral fin rays 11(6), 12(1). Pelvic fin reaching at most to middle of caudal fin, length 48.3-84.5%SL in 7 specimens. A preopercular scale in one specimen. Microbranchiospines externally on three posterior gill arches. Teeth 12-17 in upper jaw outer hemiseries, 13-20 in lower jaw outer hemiseries; two inner rows in both jaws. Lower pharyngeal tooth plate in 67.1 mm specimen (Fig. 9) wide (length 70% of

width, length of dentigerous area 71% of its width); densely distributed, distinctly bicuspid teeth, some posterior teeth tricuspid; 27 teeth in posterior row, 10 along midline. Ceratobranchial 4 with three tooth plates with 12, 15 and 3 teeth.

Colour pattern: The back is brownish without dark scale margins.

Bar 7 is simple, straight vertical, and extends down to just posterior to the pelvic fin base. Bar 6 is split into two parallel vertical bars below the middle of side, one branch extending down on each side of a vertical from the vent. Posterior bars are partially confluent along the middle of the side: bars 5 to 3 above the anal fin and continued basally on the anal fin, and bar 2, on the caudal peduncle. Light spots form in the bar interspaces along the anal fin. Usually there is a light spot at the anterior termination of the lower lateral line; in small specimens (>30 mm) and on the left side of the 75.9 mm specimen, this light spot is contiguous with the light vertical interspace between bars 6 and 5, i.e. interrupting the latter. In the small specimens there is also a light spot at the middle of the lower lateral line.

The lateral band is expressed as a row of dark brown blotches with paler brownish interspaces; the first spot in supratemporal region, followed by three blotches, the last of which is usually confluent with the blotch on the basal scaly sheath of the dorsal fin; the band continues as a dark grey stripe on the anterior part of the soft dorsal fin.

The caudal and anal fins appear immaculate, and are pale greyish or brown; the dorsal fin is immaculate except for some light spots on the soft part. The pelvic fin is dark brown with light leading margin and hyaline tips of posterior soft rays.

Distribution: (Fig. 10) The specimens studied come from within a restricted area in the Colombian Llanos, including tributaries of the Rio Meta and a tributary of the Rio Vichada.

Etymology: Named in line with *insignis* and *festivus*; the Latin adjective *egregius* means eminent, distinguished, etc.

Notes: Although the rather few, scattered localities known for Orinocoan *Mesonauta* may not permit a generalization about ranges, it is notable that *M. insignis* appears restricted to the margin of the Guiana shield, whereas *M. egregius* may be confined to the savanna plains (llanos). The two species are well distinguished by colour pattern, meristics and proportional measurements, and should be easy to tell apart should they prove to be locally associated.

***Mesonauta mirificus* n. sp.**

(Figs 1F, 2, 5, 10, 22-23, Tables 1, 10)

Bibliography: *Mesonauta insignis*: (in part) KULLANDER 1986, p. 200, figs 71-74 (Peru; description, composite of *M. mirificus* and undescribed species).

Holotype: NRM 20001. Male, 64.6 mm SL. Peru, Departamento Loreto, Rio Napo, Cayapoza, small laguna on left bank island. 15 August 1984. Collected by S.O. Kullander, A. Hogeborn-Kullander, J. Cruz R., N. Sarmiento R. (field no. SOK 104).

Diagnosis: Distinguished from all other *Mesonauta* species by its colour pattern: bar 6 including a light vertical stripe that usually divides the bar into two narrow parallel stripes below the middle of the side, and narrow dark horizontal lines along the side. Similar to *M. egregius* in having bar six doubled, but with 8 or 9 instead of 6 or 7 anal fin spines.

Material examined: Holotype and 318 paratypes, 13.1-96.6 mm SL.

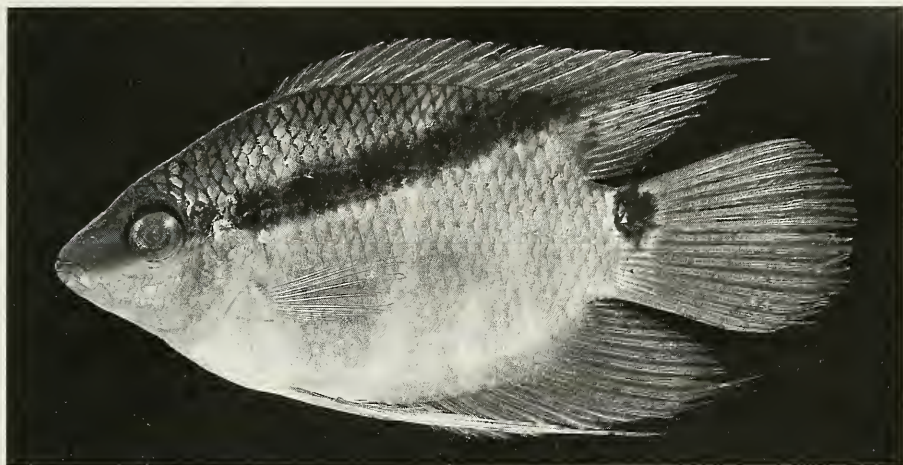


FIG. 11.

Mesonauta insignis. Specimen from the upper Rio Negro, 62.5 mm SL, USNM 269312.

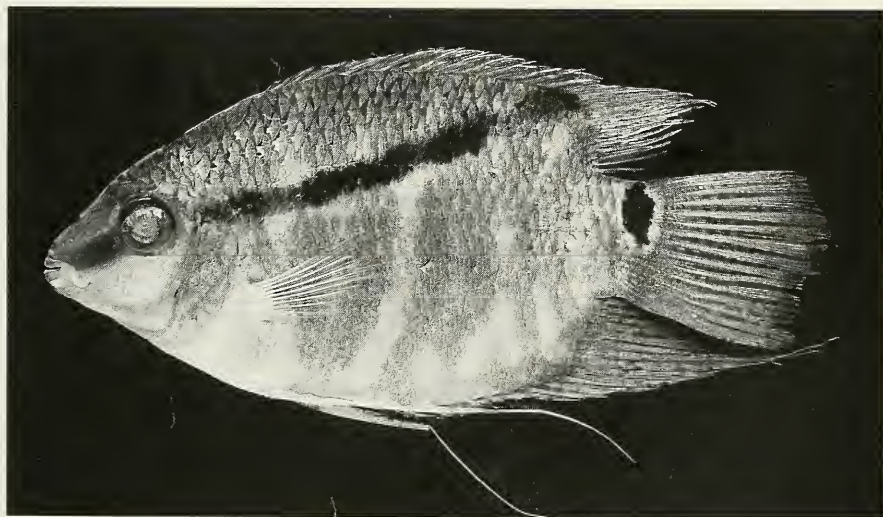


FIG. 12.

Mesonauta insignis. Specimen from near Puerto Ayacucho, Rio Orinoco drainage, 81.6 mm SL, USNM 269335.

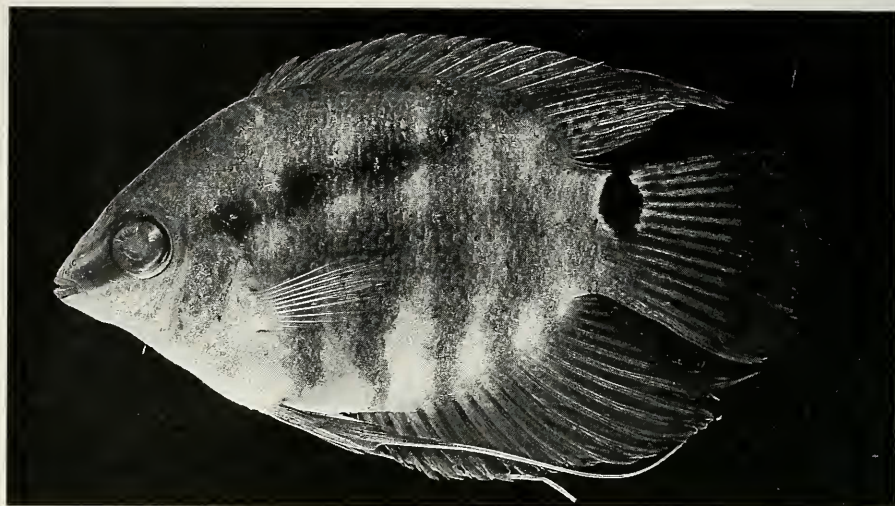


FIG. 13.

Mesonauta festivus. Specimen from Vila Bela da Santíssima Trindade, Rio Guaporé, 65.9 mm SL, NRM 26138.

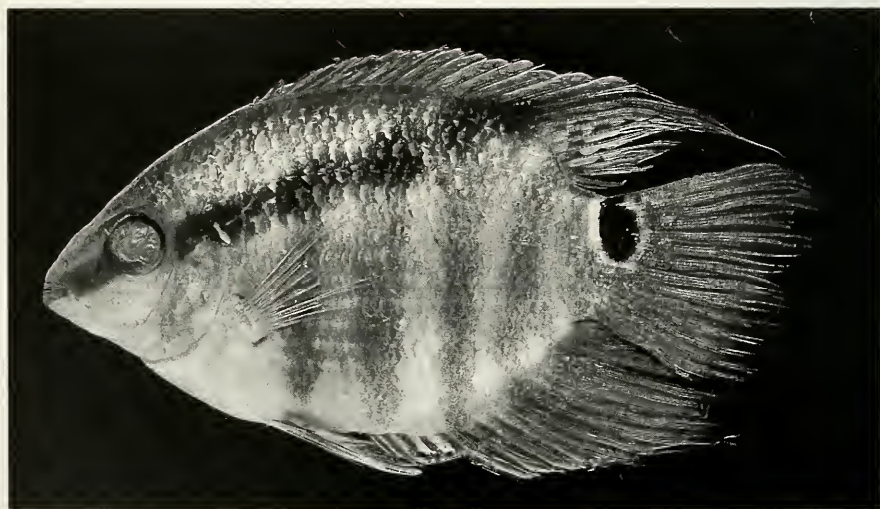


FIG. 14.

Mesonauta festivus. Specimen from Laguna Negra, Rio Paraguay drainage, 70.5 mm SL, MHNG 2495.87.

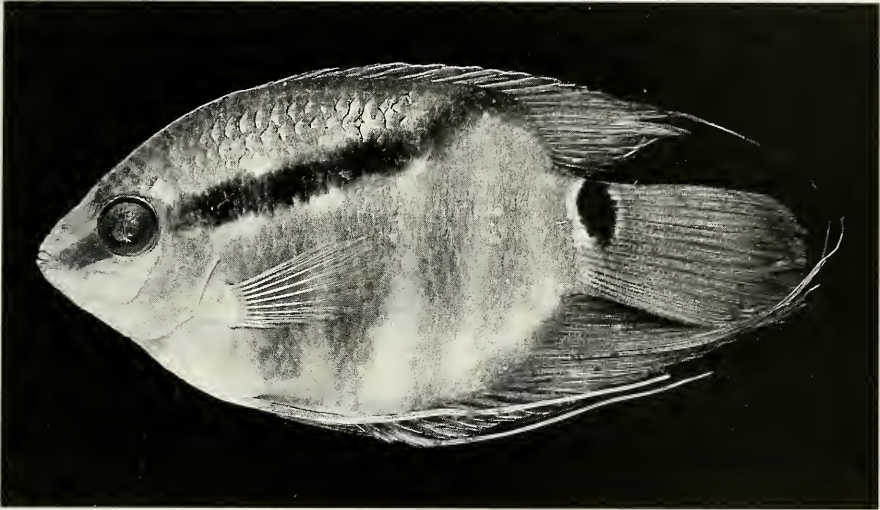


FIG. 15.

Mesonauta festivus. Specimen from Quebrada San Roque, Rio Madre de Dios drainage, 71.3 mm SL, NRM 23772.

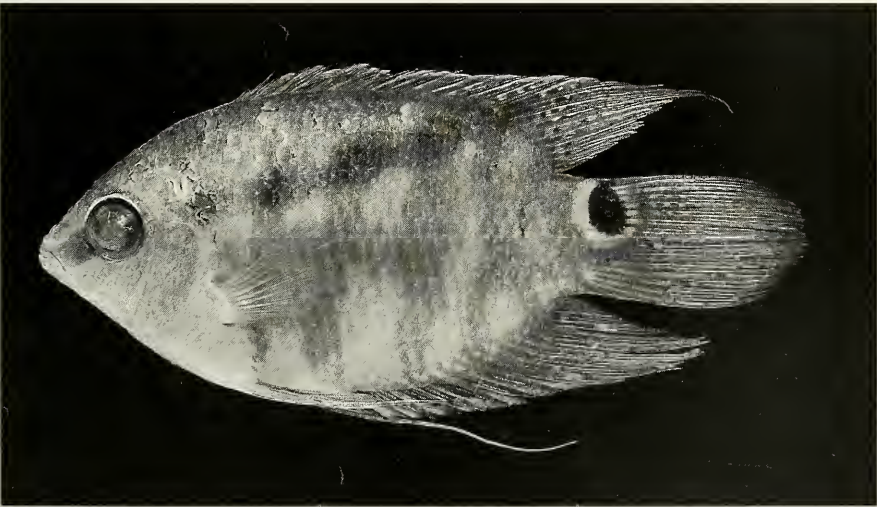


FIG. 16.

Mesonauta festivus. Specimen from Santarém, 63.6 mm SL, MZUSP 8507.

Description: Counts in Tables 2-5, measurements in Table 10, see also Fig. 2. Moderately deep. Snout short, rounded. Predorsal contour straight or, particularly frequent among large specimens, bulging above orbit. Scales in transverse row 11+1+4. A preopercular scale in one specimen. Cheek scale rows 3(27), 4(3). Soft dorsal fin with pointed tip, reaching at most to end of caudal fin; anal fin with long, wide point reaching to end of caudal fin. Pectoral fin rays 10(2), 11(27), 12(1). Pelvic fin reaching at most to slightly beyond middle of caudal fin, its length 65.5-100.2% SL in 26 specimens. Teeth 9-17 in upper jaw, 15-20 (23 in one) in lower jaw; inner rows in upper jaw 2, rarely 3; inner rows in lower jaw 1 in young, 2-3 in adults. Microbranchiosphines externally on three posterior gill arches. Lower pharyngeal tooth plate (Fig. 5) wide, length 71-81% of width in four specimens examined, 19.8-78.3 mm SL, length of dentigerous area 65% of width in three, 66% in one; teeth in posterior row 23-28, along middle 6-8; all teeth distinctly bicuspid, with long antrorse posterior cusp and smaller rostral cusp, except for indication of additional rostral edge cusps on large medioposterior teeth. Ceratobranchial 4 in 78.3 mm specimen with three tooth plates with 2, 9, 10 teeth.

Colour pattern: There is some variation in colouration and notable is that specimens from the Nanay are overall light, with whitish ground colour and grey to black markings (Fig. 23), compared to samples from elsewhere which have yellowish ground colour and brown to black markings (Fig. 22).

The back is without reticulations, but a pattern of dark stripes along the sides, particularly distinct in the otherwise light Nanay specimens, may extend onto dorsal sides. These stripes consist of horizontal rows of indistinct dark dots on scale centers. The sides of the chest are pigmented.

The vertical bars are distinct. The third from anteriormost bar (corresponding to bar 6) is separated from the next posterior bar by an interspace wider and lighter than other bar interspaces. Bar 7 is a simple bar ending slightly behind the pelvic spine base. Bar 6 is much wider than other bars and with few exceptions includes a light vertical stripe almost or actually dividing the bar into two parallel vertical bars; the posterior part of the bar extends down to the first two anal spines whereas the anterior part remains slightly above the abdominal margin. Bar 5 is rarely split ventrally, above anal spines 5-7 or 6-7. Bar 4 is above the junction of the soft and spinous portions of the anal fin. Bar 3 is above the middle of the soft anal fin. Bar 2 crosses the caudal peduncle. In specimens smaller than ca 40 mm bar 6 is wide but not split, and the posterior sides are mottled, without distinct bar pattern. In the largest Nanay specimen, 96.6 mm SL, separation of bar 6 divisions is complete and the divisions appear like separate bars.

The lateral band is black and never blotchy except that it is usually faint, sometimes interrupted, where crossing the dorsally extended light interspace between bars 6 and 5; and that at the beginning of the lateral line it is slightly expanded dorsad. The band is lined with more or less prominent light spots in the interspaces between the vertical bars, and usually it becomes gradually fainter as it approaches the dorsal fin. It is usually not distinctly continued on the dorsal fin except in several Nanay specimens.

The dorsal fin is smoky, with an indistinct pattern of hyaline dots. The caudal and anal fins are greyish or brownish, immaculate save for the caudal ocellus. The pelvic fin is commonly dark brown or blackish all over, including the filament.

Live colours: From a colour slide of a young specimen from Puñuisiqui Cocha. Whitish with pale grey vertical bars, distinct grey horizontal striping and blackish lateral band and caudal spot. The lower jaw close to the mouth, the intermandibular area and the branchiostegal membrane are bright yellow. The posterior rays of the dorsal fin are yellow, the light ring around the caudal spot yellowish white.

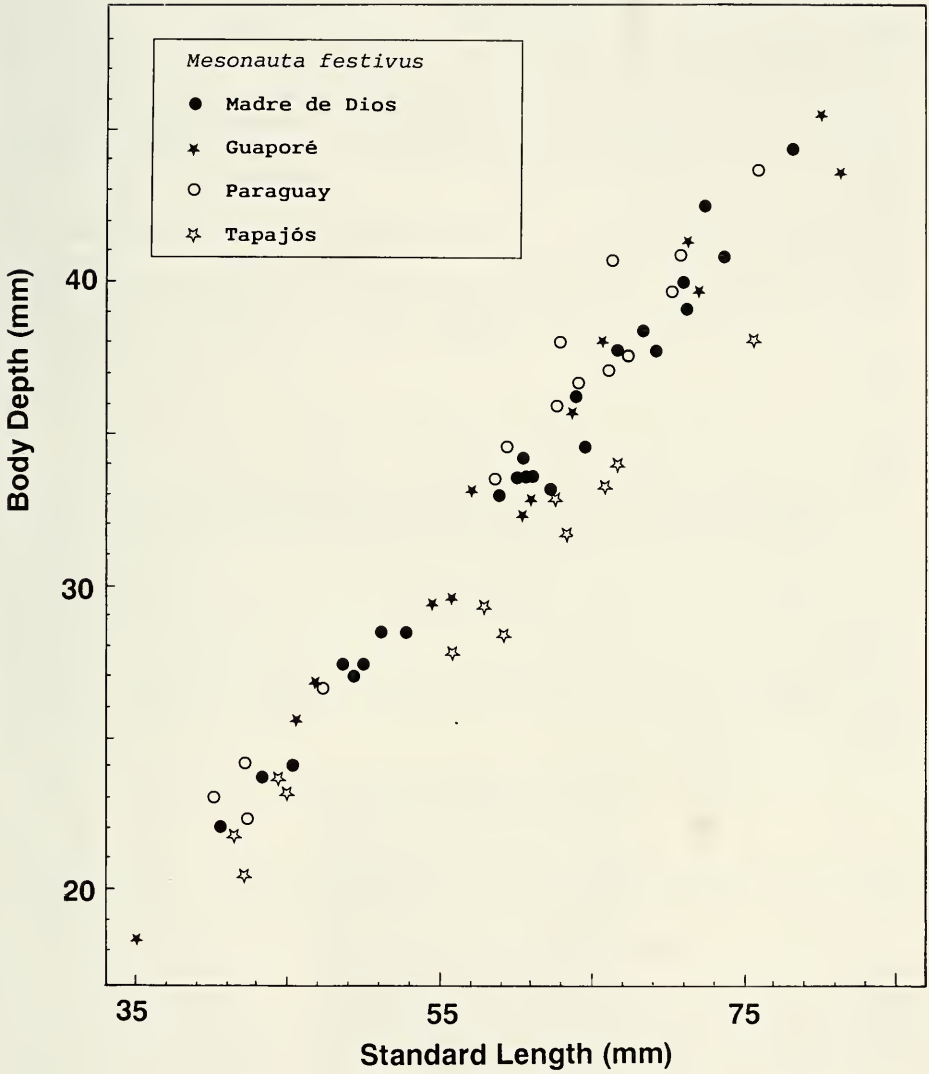


FIG. 17.

Mesonauta festivus. Body depth plotted against SL to show that Tapajós specimens are distinctly more slender bodied at sizes over 50 mm SL.

Distribution: Collected only in Peru and adjacent Colombia: from Yarina Cocha on the middle Rio Ucayali down to Isla Mocagua little upstream of Leticia on the Rio Amazonas (Fig. 10). *Mesonauta mirificus* is sympatric with another *Mesonauta* species in the Rio Napo where, however, the two are not collected in association, and in the Rio Ampiyacu where found associated at one site (Quebrada Sacarita near Pebas). The type locality is close to the mouth of the Rio Mazán, near the mouth of the Rio Napo.

Ecology: *Mesonauta mirificus* is commonly seen swimming in small groups near the surface, usually close to tree litter or vegetation in quiet water. Collecting sites are very varied, including black water river conditions, white water lakes and rivers, and small streams.

Etymology: Named in line with *insignis* and *festivus*; the Latin adjective *mirificus* means wonderful.

Local names: "Bujurqui" (Iquitos area; KULLANDER 1986), "Bufurqui" (Quisto Cocha; LÜLING 1963); these are only orthographic variants, and simply mean 'cichlid'.

Notes: This species was identified as *M. insignis* by KULLANDER (1986) who included two species under that name. The second species, which was figured by KULLANDER (1986, pl. XXII, fig. 2) and which is sympatric with *M. mirificus* in easternmost Peru, remains unnamed. It can be distinguished by having bar 5 instead of bar 6 divided. From KULLANDER's (1986) material we only reexamined that deposited in NRM; most likely the rest includes both of the Peruvian *Mesonauta* species.

The dentigerous area of the lower pharyngeal tooth plate appears to be wider than in any of the other *Mesonauta* species (length 65-66% of width compared to 71-80%), but data are insufficient for generalization. *Mesonauta mirificus* shares one distinctive characteristic with *M. egregius*, namely the more or less divided bar 6, but anal fin counts (Table 4) clearly separate the two species. In shape features, *M. insignis* seems to be overall fairly elongate but still short snouted. KULLANDER (1986, fig. 74) attempted to show two morphometric differences separating *M. insignis* (= *M. mirificus* and a second species) from *M. festivus*; regrettably the species names on the figure were exchanged, and the measurement units should read as mm⁻¹.

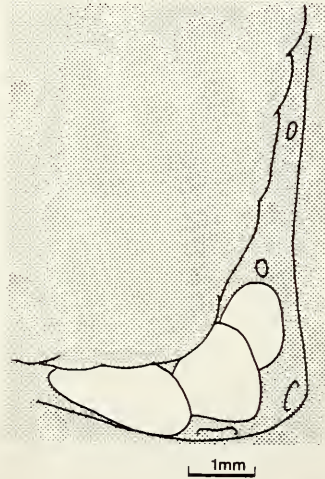


FIG. 18.

Mesonauta acora. Characteristic arrangement of scales on the preopercle. USNM 235633, 37.0 mm

ACKNOWLEDGMENTS

We are indebted to many people who contributed over the years to make possible the present paper; William G Saul, Eugenia B Böhlke (ANSP), James Chambers (BMNH), William N Eschmeyer and David Catania (CAS), Donald J Stewart (FMNH), Efreim Ferreira (INPA), Volker Mahner (MHNG), Erica Caramaschi, Helena São Thiago and Décio Moraes (MNRJ), Heraldo Britski, Naércio Menezes and José Lima de Figueiredo (MZUSP), Harald Ahnelt and the late Rainer Hacker (NMW) and Richard P Vari (USNM) made available collections in their care. Anita Hogeborn-Kullander, Kenny Tanizaki, Marco Túlio Lacerda, Andrés Urteaga and Teresa Townshend participated in collecting in Peéru and/or Brazil. Uwe Werner and Rosemary H Lowe-McConnell contributed with specimens, Anita Hogeborn-Kullander made the photographs. Financial support to this study was provided by the Swedish Natural Science Research Council grant B-BU 4568 to SOK. This is contribution no. 4 from the Project Diversity of Tropical Freshwater Fishes at the Department of Vertebrate Zoology, NRM.

MATERIAL EXAMINED

The material is listed, in the same order as in the paper, with catalogue number, number of specimens and locality. Measurements are given only for specimens measured for Tables 1, 6-10.

Mesonauta insignis

LECTOTYPE

NMW 24415. 1, 93.7 mm. Brazil, Est Amazonas, 'Rio negro' [Marabitanas]. No date. J. Natterer.

PARALECTOTYPES

B R A Z I L , Est Amazonas, Rio Negro drainage: NMW 24416-24417.. 2. 'Rio negro' [Marabitanas]. No date. J. Natterer.

NON-TYPES

V E N E Z U E L A , Rio Orinoco drainage: CAS SU 54241. 9. Edo Bolívar, Caño de Quiribana. NRM 12037. 3. Edo Bolívar, Embalse de Guri, 7 km W of El Manteco. – USNM 269303. 3 (1: 52.0 mm). Terr Federal Amazonas, small drying backwater pool off road from El Burro to Puerto Ayacucho. – USNM 269335. 31 (10: 65.1-82.5 mm). Terr Federal Amazonas, Balnearia Pozo Azul, ca 1 km E of Puerto Ayacucho to Solano road, ca 30 km N of Puerto Ayacucho.

V E N E Z U E L A , Terr Federal Amazonas, Rio Negro drainage: NRM 26265. 1 (1: 43.8 mm). Caño Dap (?), upstream of Solano and downstream of Caño Daciapo. – NRM 26266. 1 (1: 39.3 mm). Caño Adabo. – USNM 269292. 2 (1: 51.9 mm). San Carlos de Rio Negro, Rio Negro margin upstream of town landing. – USNM 269293. 8. Caño Chola where crossed by road from San Carlos de Rio Negro to Solano. – USNM 269305. 12. Lagoon NE airport of San Carlos de Rio Negro. – USNM 269312. 16 (2: 43.4-62.5 mm). Small caño off Caño Urami, just upriver of Santa Lucía.

C O L O M B I A , Com Guainía, Rio Inírida drainage: NRM 26185. 1. Puerto Inírida, flooded caño. – NRM 26201. 3. Rio Guaviare, Cuayare. – NRM 18170. 2. Laguna at Cerro Mavecuri.

Mesonauta festivus

P E R U , Depto Madre de Dios, Rio Madre de Dios drainage: NRM 23767, 12 (2: 20.8-43.5 mm). Quebrada and roadside pools at Km 14 on road Puerto Maldonado-Cuzco. –NRM 23772. 8 (8:60.2-73.7 mm). Quebrada San Roque at Km 8 on road Puerto Maldonado-Cuzco. – USNM 263855. 14 (6: 45.5-68.6 mm). Reserva Natural de Tambopata, Laguna Cocococha, 5.1 km E of Explorers Inn. – USNM 264087. 9 (7: 49.5-72.6 mm). Reserva Natural de Tambopata, Laguna Chica, end opposite boat dock (farthest from trail leading to lodge). – USNM 266789. 3. Same data as USNM 264087. – ANSP 143550. 2 (2: 61.2-78.3 mm). 69°16.5'W 12°32'S. – CAS 54638 1. 14 km ENNE Puerto Maldonado, Lago Sandoval.

B R A Z I L , Est Pará, Rio Tapajós drainage: CAS 66918 3 (3: 59.4-66.0 mm). Near Santarém, in tide pools. – MZUSP 8507. 6 (6:42.3-75.8 mm). Santarém, igarapé on left bank of Mapiri. – NRM 23205. 1. Mouth of igarapé just upstream of town of Aveiro. – NRM 26164. 2. Praia in front of town of Aveiro. – NRM 26166. 6. Santarém, igarapé at S end of city. – NRM 26165. 6 (2: 44.5-45.1 mm). Santarém, igarapé at S end of city. – NRM 26080. 1 (1: 41.7 mm). Santarém, igarapé at S end of city. B R A Z I L , Est Rondônia, Rio Jamari drainage: INPA 3537. 1. Rio Canaã, Lago Fortaleza ca 10 km above Ariquemes. – INPA 3538. 3. Lago below mouth of Igarapé Japiim, Lagoa Boa Esperança. – INPA 3539. 4. Est Rondônia, Lago Fortaleza, Ariquemes. B R A Z I L , Est Rondônia, Rio Mamoré drainage: INPA 3535. 43. Guajará-Mirim, Rio Pacaás Novos. – INPA 3536. 37. Mouth of Rio Pacaás Novos ca 15 km from Guajará-Mirim. B R A Z I L , Rio Guaporé drainage: INPA 3530. Est Rondônia, mouth of Rio Guaporé. Surpresa. – INPA 3531. 16, 24.5-57.2 Est Rondônia, Rio Guaporé in front of Costa Marques. – INPA 3532. 24. Est Rondônia. Rio Guaporé at Surpresa. – INPA 3533. 4 (4: 71.5-81.6 mm). Est Rondônia, Rio Guaporé upstream of Surpresa. – INPA 3534. 8. Est Rondônia, Rio São Domingos on road that links Costa Marques with P. Medici, Km 62. – MZUSP 36937. 2. Est Mato Grosso, Rio Alegre, ca 30 km from Vila Bela da Santíssima Trindade. – MZUSP 37505. 3, 39.8-81.2. Est Mato Grosso, Rio Alegre, ca 30 km from Vila Bela da Santíssima Trindade. – MZUSP 37524. 2. Est Mato Grosso, Vila Bela da Santíssima Trindade. – MZUSP uncat. 1. Est Rondônia. Príncipe da Beira. – NRM 26138(31) and MHNG 2514 17(5). 36 (6: 54.7-65.9). Est Mato Grosso, mun. Vila Bela da Santíssima Trindade, Rio Guaporé at ferry landing in Vila Bela da Santíssima Trindade. – USNM 235638. 18 (1:35.3 mm). 'Brazil-Bolivian border region between Guajará-Mirim and Mato Grosso, Guaporé drainage'. B R A Z I L , Rio Paraguai drainage: CAS 14678. 1 yg. Est Mato Grosso do Sul, Corumbá. – MNRJ 11763. 1. Est Mato Grosso, mun Cáceres. Baía de Campo on the Fazenda Pantanalzinho in Porto Espiridião. – MNRJ 11764. 1. Est Mato Grosso, mun Cáceres, Baía no Campo on the Fazenda Pantanalzinho in Porto Espiridião. – MNRJ 11765. 1. Est Mato Grosso, mun Cáceres, sidearm of Rio Paraguai ca 5 km from permanent channel, road Cáceres-Porto Espiridião. – MNRJ uncat. 1. Est Mato Grosso, swampy area adjacent to Rio Paraguai, on road Cáceres-Porto Espiridião, ca 6 km from Cáceres. – MZUSP 35881. 1. Est Mato Grosso, mun Itiquira, Rio Piquiri, Fazenda Santo Antonio do Paraíso. – MZUSP 35902. 6. Est Mato Grosso, mun Itiquira, lakes at Fazenda Santo Antonio do Paraíso. – MZUSP 25291. 2. Est Mato Grosso, mun Itiquira, Rio Itiquira, Baía Grande, Fazenda Santo Antonio do Paraíso. – MZUSP 16171. 30. Est Mato Grosso, mun Cáceres, Descalvados. – MZUSP 36415. 14. Est Mato Grosso do Sul, mun Corumbá, Nhecolândia, Fazenda Nhumirim, Baía de Búfalos. – MZUSP 4465. 2. Est Mato Grosso, Santo Antonio do Leverger, lagoa. – MZUSP 16170. 2. Est Mato Grosso, mun Barão de Melgaço, Rio Cuiabá, Boca do Croara. – MZUSP 16068. 1. Est Mato Grosso, mun Poconé, lagoa on Rodovia Transpantaneira, Km 10. – MZUSP uncat. 1. Est Mato Grosso, Ilha de Taiamã (SEMA). – MZUSP 25270. 2. Est Mato Grosso, Itiquira, internal lakes of the Piquiri-Itiquira system, Fazenda Santo Antonio do Paraíso. – MZUSP 13990. 1. Est Mato Grosso, pond on road MT-60 near Poconé.

B O L I V I A , Rio Beni drainage: CAS 14671. 11. Depto Beni, lagoon near Reyes. B O L I V I A , Depto Beni, Rio Mamoré drainage: NRM 13462. 4. Rio Mocovi near Trinidad. – NRM 13500. 2. Pools along road from Trinidad to Peroto. – USNM 305553. 26. Small pond south of El Porvenir Biological Station entrance, 41 air km E of San Borja. – USNM 305895. 6. Borrow pit by road ca. 1.5 km W of Rio Matos crossing 45 air km E of San Borja. – USNM 305869. 8. Marsh channel draining Lago Normandia ca 1 km N of lake, 40 air km E of San Borja. B O L I V I A , Rio Guaporé drainage: IRSNB 20909. 2 (2: 45.8-46.9 mm). Depto Santa Cruz, Rio Surucusi, tributary to Rio San

Miguel on road from Ascención, 14 km N of Limón. – NRM 13081. 1 (1: 63.8 mm). Depto Beni, Rio Blanco.

P A R A G U A Y , Prov. Concepción, Rio Paraguay drainage: CAS 14672. 1. Prov Concepción, Laguna, Arroyo Trementina. – MHNG 2235.98. 4. Laguna Negra, 15 km E of Paso Bareto. – MHNG 2495.87(6) and NRM 12289(3). 9 (9: 59.6-76.0 mm). Estancia Laguna Negra, 15 km E of Paso Bareto. – MHNG 2495.88(5) and NRM 12290(2). 7 (7: 40.3-71.0 mm). Estancia Laguna Negra, 15 km E of Paso Bareto.

Mesonauta acora

B R A Z I L , Est Mato Grosso, Rio Xingu drainage: BMNH 1985.6.20:1252-1261. 4 (1: 44.3 mm). Corrego do Gato (Rio Suiá-Missu). – BMNH 1985.6.20:1252-1261. 5 (5: 34.6-49.2 mm). Corrego do Gato. – USNM 235633. 15 (3: 37.0-50.7 mm). Small tributary of Rio Batovi. – NRM 14605. 2 (2: 52.2-70.5 mm). First stream crossing road São José do Xingu-Curicaca. B R A Z I L , Est Pará, Rio Tocantins drainage: INPA 3528. 1 (1: 65.3 mm). Itupiranga. – INPA 3529. 1 (1: 59.3 mm). Itupiranga.

Mesonauta egregius

H o l o t y p e

ICN-MHN 1686. 1, 57.2 mm. Colombia, Depto Vichada, Rio Vichada drainage, Rio Guarrojo, Finca Boca de Guarrojo, laguna no. 1. 8 Mar 1972. T. Hongslo (Field no. VIT 63).

P a r a t y p e s

C O L O M B I A , Depto Meta, Rio Meta drainage: NRM 12280. 1 (1: 47.9 mm). Laguna middistance Rio Yucao-Rio Manacacias, 300 m from road Puerto López-Puerto Gaitán.– FMNH 92863. 9 (3: 41.1-44.2 mm). Caño Cabluna, ca 30 km from Puerto Gaitán toward Puerto Carreño. C O L O M B I A , Rio Vichada drainage: NRM 11302. 2 (2: 67.1-75.9 mm) Depto Vichada, Rio Guarrojo, Finca Boca de Guarrojo, laguna no. 1.

Mesonauta mirificus

H o l o t y p e

NRM 20001. 1, 64.6 mm. Peru, Depto Loreto, Rio Napo drainage Cayapoza, small laguna on left bank island. 15 Aug 1984. S.O. Kullander *et al.* (Field no. SOK 104).

P a r a t y p e s

P E R U , Depto Loreto, Rio Marañón drainage: NRM 24734. 6. Rio Samiria drainage, At'un Caño, gramalote. – NRM 24602. 3, 41.2-48.8. Rio Samiria drainage, Quebrada Santa Elena, playa and small bay. P E R U , Rio Ucayali drainage: NRM 23428(10) and MUSM 3049(3). 13 (5: 50.8-77.7 mm). Depto Ucayali, Yarina Cocha, caño to Paca Cocha. –NRM 23480. 5. Depto Ucayali, caño between Yarina Cocha and Cashibo Cocha, ca 8 km NW Puerto Callao. –NRM 23444(1) and USNM 31302(4). 14 (5:47.4-56.5 mm). Depto Ucayali, Yarinacocha, caño to Paca Cocha. – NRM 23561. 1. Depto Loreto, Quebrada Abrahancillo, left bank tributary of the R. Aucayacu. – NRM 13528. 1. Depto Ucayali, shore of Yarina Cocha near La Cabaña. P E R U , Depto Loreto, Rio Itaya drainage: NRM 23768. 2. Quisto Cocha, lake shore. – NRM 23891. 2. Quisto Cocha W margin. P E R U , Depto Loreto, Rio Nanay drainage: NRM 23301. 45. Zúngaro Cocha. – NRM 23504. 9 (5:43.3-63.2 mm). Vincente Cocha, just upstream from Bella Vista. – NRM 23515. 36. Left bank cocha a few km upstream of Santa Clara. 5 spms cleared and stained. – NRM 23619. 1. Unnamed quebrada close to Santa Clara. – NRM 23769. 6. Rio Nanay, Tinaja, left bank playa. – NRM 23770. 3. Quebrada Pampachica at ENTEL station, 6 km from Iquitos. – NRM 23766. 9. Rio Nanay system, Quebrada Corrientillo, 20 km from Iquitos on road to Puerto Almendra. – NRM 23771(27) and MHNG uncat. (5)

and MUSM 3049(5). 37 (5:61.8-86.2 mm). Bella Vista, Vieja Cocha. -NRM 23888. 1. Rio Nanay left bank sand playa opposite Llanchama Cocha. - NRM 23893. 18. Puñuisiqui Cocha. -NRM 23890. 1. Quebrada Corrientillo at bridge on road Iquitos-Puerto Almendra. - NRM 13532. 1. Forest laguna ca 1000 m from Rio Nanay between Iquitos and Santa Clara. P E R U , Depto Loreto, Rio Napo drainage: NRM 23892. 5 (1:67.1 mm), Aucapoza Cocha. -NRM 23895. 83 (9:36.4 mm) and 25663. 1. Cayapoza, small laguna on left bank island. P E R U , Depto Loreto, Rio Amazonas drainage: NRM 23377. 3. Sacarita del Tuyé, opposite Pebas, floating meadow. - NRM 234032. 2. Sacarita del Tuyé, opposite Pebas, floating meadow. - NRM 20002. 1. Quebrada Sacarita, a few km upstream of Pebas. - NRM 25510. 8. Rio Tahuayo drainage, Caño Huayti, gramalotales. C O L O M B I A , Comisaría Amazonas, Rio Amazonas drainage: NRM 12281. 1. Isla Mocagua, Laguna Resaca.

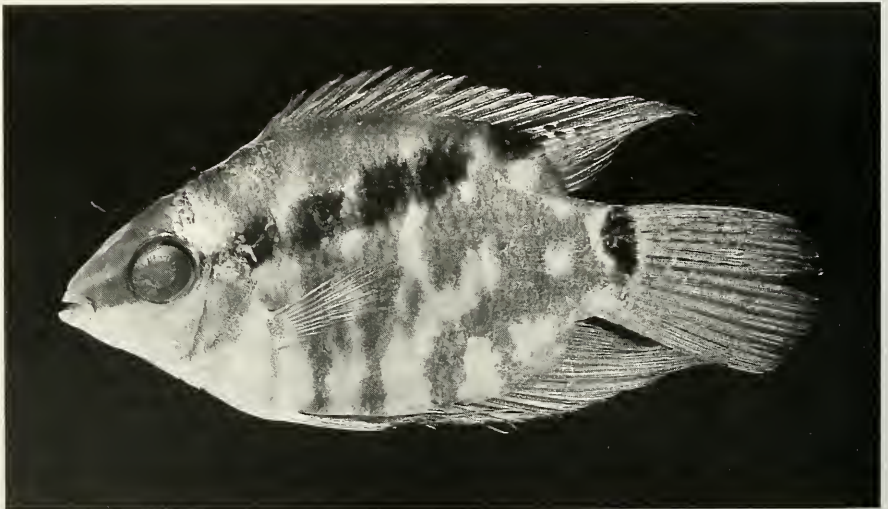


FIG. 19.

Mesonauta acora. Specimen from the upper Rio Xingu, 40.9 mm SL, BMNH 1985.6.20:1252-1261.

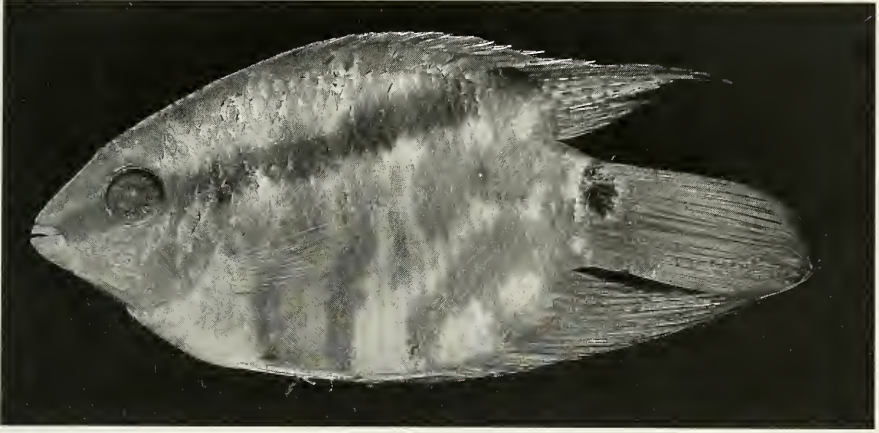


FIG. 20.

Mesonauta acora. Specimen from Itupiranga, Rio Tocantins, 59.3 mm SL, INPA 3529.

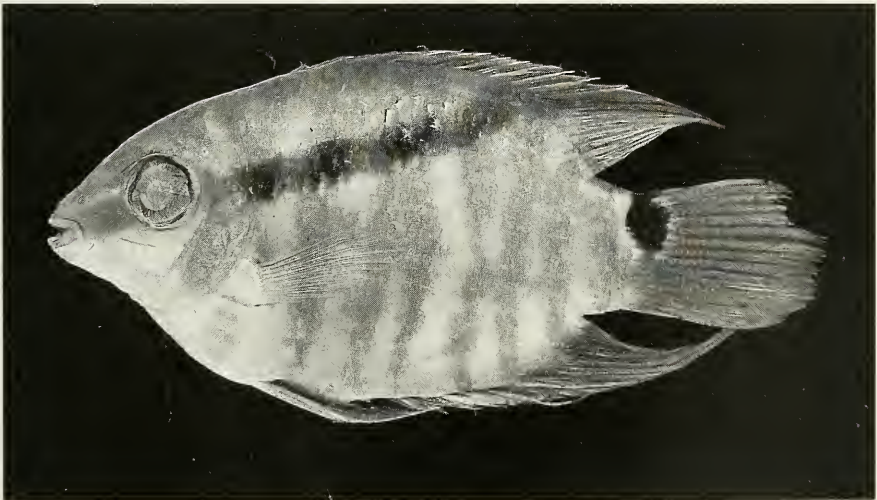


FIG. 21.

Mesonauta egregius. Holotype, from Rio Guarrojo, 57.2 mm SL, ICN-MHN 1686.

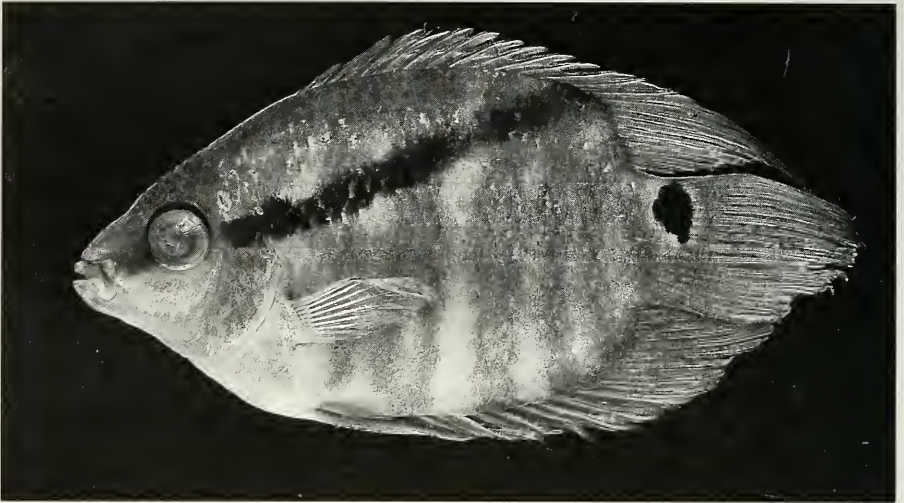


FIG. 22.

Mesonauta mirificus. Holotype, from lower Río Napo, 64.6 mm SL, NRM 20001.

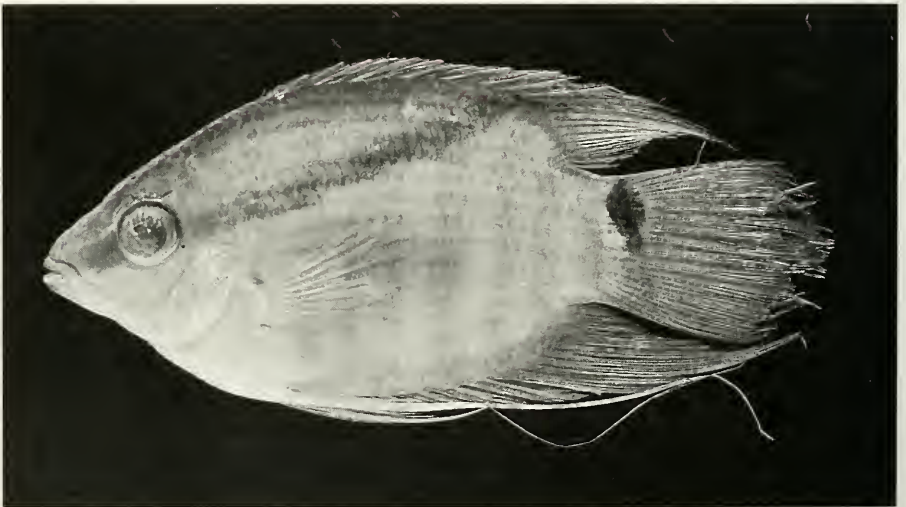


Fig. 23.

Mesonauta mirificus. Paratype, from Rio Nanay, 61.8 mm SL, NRM 23771.

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TABLE 1.

The ratio snout length as per cent of body depth in *Mesonauta* species. Same material as in Tables 6-10.

Species	N	Min-max	$\bar{x} \pm SE$
<i>M. insignis</i>	17	21.3-26.9	22.6 \pm 0.31
<i>M. festivus</i> TAPAJOS	12	16.5-22.9	19.5 \pm 0.55
<i>M. festivus</i> (remaining)	55	14.5-20.0	16.5 \pm 0.17
<i>M. acora</i>	12	17.1-20.1	18.2 \pm 0.28
<i>M. egregius</i>	7	16.7-21.1	18.4 \pm 0.55
<i>M. mirificus</i>	30	16.0-23.1	19.5 \pm 0.26

TABLE 2.

E1 row scales and gill raker counts of *Mesonauta* species.

Species	E1 scales				Gill rakers			
	24	25	26	27	5	6	7	8
<i>M. insignis</i> ORINOCO		1	11	1		2	10	1
<i>M. insignis</i> NEGRO		9	7	1		8	8	1
<i>M. festivus</i> PARAGUAY	1	6	9			14	2	
<i>M. festivus</i> GUAPORÉ		9	4	1	2	8	4	
<i>M. festivus</i> PERU	1	14	9			15	10	
<i>M. festivus</i> TAPAJOS		8	3		2	3	7	
<i>M. acora</i> XINGU		16	6		4	6		
<i>M. acora</i> TOCANTINS		2			1	1		
<i>M. egregius</i>	8	3	1		3	4		
<i>M. mirificus</i>	6	20	4			5	25	

TABLE 3.
Lateral line scale counts of *Mesonautia* species. Upper above, lower below bar.

Species	Lateral lines																								
	<u>14</u> 7	<u>14</u> 8	<u>14</u> 10	<u>15</u> 7	<u>15</u> 8	<u>15</u> 9	<u>15</u> 10	<u>16</u> 6	<u>16</u> 7	<u>16</u> 8	<u>16</u> 9	<u>16</u> 10	<u>16</u> 11	<u>17</u> 6	<u>17</u> 7	<u>17</u> 8	<u>17</u> 9	<u>17</u> 10	<u>18</u> 7	<u>18</u> 8	<u>18</u> 9	<u>18</u> 10	<u>19</u> 8	<u>19</u> 9	
<i>M. insignis</i> ORINOCO								3							1	5	3			1					
<i>M. insignis</i> NEGRO						1		4							1	3	3			1	1	1			1
<i>M. festivus</i> PARAGUAY	1	1	1	2	1				1			1	2	3											
<i>M. festivus</i> GUAPORÉ						1			1					1	3	1				1		3			1
<i>M. festivus</i> PERU								2		2				1	10	3				2	3	1			
<i>M. festivus</i> TAPAJOS					2				1	1	1				2	1									
<i>M. acora</i> XINGU															4					2	1				1
<i>M. acora</i> TOCANTINS																1									1
<i>M. egregius</i>																1									1
<i>M. mirificus</i>	1				1				3	5	1	1			1	4	6			2	1				1

TABLE 4.

Dorsal and anal fin counts of *Mesonautia* species.

Species	Dorsal fin												Anal fin											
	XIV			XV			XVI			VI			VII			VIII			IX					
	<u>10</u>	<u>11</u>	<u>12</u>	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>10</u>	<u>11</u>	<u>11</u>	<u>12</u>	<u>12</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>13</u>	
<i>M. insignis</i> ORINOCO				4	4	1	4											1	8					3
<i>M. insignis</i> NEGRO		1		6	7	3												1	3	10	1			1
<i>M. festivus</i> PARAGUAY	1		1	13		1								2				4	10					
<i>M. festivus</i> GUAPORÉ				1	12	1								5				3	1	2				1
<i>M. festivus</i> PERU	1	1		1	16	6								1	4	1		1	9	7				2
<i>M. festivus</i> TAPAJOS				6	5	1												1	3					1
<i>M. acora</i> XINGU	1			9	11	1	1							1				13	5					3
<i>M. acora</i> TOCANTINS				2															1					1
<i>M. egregius</i>	2	7	1	2	2																			
<i>M. mirificus</i>	2	2	2	1	11	10	1											2	14	2				1

TABLE 5.
Vertebral counts of *Mesonauta* species.

Species	Vertebrae						
	11+14	11+15	12+14	12+15	13+13	13+14	13+15
<i>M. insignis</i> ORINOCO				1		6	3
<i>M. insignis</i> NEGRO				2		10	1
<i>M. festivus</i> PARAGUAY					1	6	
<i>M. festivus</i> GUAPORÉ				1	1	8	
<i>M. festivus</i> PERU			3		4	1	
<i>M. festivus</i> TAPAJOS		1	4	2		2	
<i>M. acora</i> XINGU				1		11	2
<i>M. acora</i> TOCANTINS					1	1	
<i>M. egregius</i>					10		
<i>M. mirificus</i>	1		18	4	3		

TABLE 6.

Measurements of *Mesonauta insignis* from the Negro and Orinoco drainages, in per cent of SL.

Measurement	<i>M. insignis</i> NEGRO N=6, 39.3-93.7 mm SL			<i>M. insignis</i> ORINOCO N=11, 52.0-82.5 mm SL		
	N	Min-max	$\bar{x} \pm SE$	N	Min-max	$\bar{x} \pm SE$
Head length	6	34.5-37.4	35.5±0.53	11	32.0-35.2	33.4±0.24
Snout length	6	10.2-13.0	11.2±0.39	11	10.7-12.1	11.4±0.14
Body depth	6	47.6-50.6	49.0±0.42	11	47.9-53.4	50.5±0.43
Orbital diameter	6	10.9-16.3	13.7±0.83	11	10.8-12.5	11.8±0.14
Head width	6	17.5-18.7	18.0±0.18	11	18.1-19.1	18.6±0.10
Interorbital width	6	13.0-15.3	14.2±0.36	11	13.8-16.4	15.3±0.24
Preorbital depth	6	5.9- 9.8	7.2±0.58	11	6.3- 9.3	8.4±0.24
Caudal peduncle depth	6	19.2-21.5	20.1±0.32	11	19.6-22.4	21.1±0.20
Caudal peduncle length	6	4.1- 6.0	5.0±0.34	11	5.1- 6.4	5.6±0.12
Pectoral fin length	4	27.2-28.3	27.6	11	25.4-29.3	27.1±0.35
Last D spine length	5	25.5-28.2	27.0±0.46	7	20.8-26.3	23.8±0.76

TABLE 7.

Measurements of *Mesonauta festivus* from the Paraguay and Guaporé drainages, in per cent of SL, except SL (in mm).

Measurement	<i>M. festivus</i> PARAGUAY N=16, 40.3–76.0 mm SL			<i>M. festivus</i> GUAPORÉ N=13, 35.3–80.3 mm SL		
	N	Min-max	$\bar{x}\pm SE$	N	Min-max	$\bar{x}\pm SE$
Head length	16	31.4–34.3	32.6±0.21	13	31.6–35.7	33.2±0.33
Snout length	16	7.8–10.5	9.1±0.17	13	8.4–10.2	9.5±0.17
Body depth	16	52.5–61.1	57.0±0.47	13	51.8–57.8	55.3±0.58
Orbital diameter	16	12.1–15.1	13.1±0.22	13	11.8–15.0	13.3±0.20
Head width	16	18.7–20.3	19.4±0.11	13	18.1–20.4	18.9±0.19
Interorbital width	16	14.8–17.5	16.1±0.16	13	13.6–18.6	15.7±0.34
Preorbital depth	16	5.6– 8.9	7.5±0.23	13	5.7– 9.2	7.2±0.25
Caudal peduncle depth	16	20.9–23.6	22.5±0.20	13	20.1–24.5	22.8±0.40
Caudal peduncle length	16	4.8– 6.6	5.7±0.13	13	5.1– 7.2	6.0±0.16
Pectoral fin length	15	27.2–29.9	28.6±0.20	13	25.5–32.0	28.2±0.48
Last D spine length	16	21.3–25.3	23.3±0.26	13	20.0–25.2	23.0±0.42

TABLE 8.

Measurements of *Mesonauta festivus* from the Rio Tapajós and Peruvian Rio Madre de Dios, in per cent of SL.

Measurement	<i>M. festivus</i> TAPAJOS N=12, 41.7–75.8 mm SL			<i>M. festivus</i> PERU N=25, 40.8–78.3 mm SL		
	N	Min-max	$\bar{x}\pm SE$	N	Min-max	$\bar{x}\pm SE$
Head length	12	30.6–33.7	32.7±0.27	25	31.1–34.3	32.6±0.17
Snout length	12	8.6–11.2	9.9±0.25	25	7.7–10.6	9.0±0.17
Body depth	12	47.8–53.0	50.5±0.46	25	52.7–58.5	55.2±0.27
Orbital diameter	12	10.6–13.7	12.4±0.29	25	11.8–14.5	13.2±0.16
Head width	12	17.1–18.8	17.9±0.16	25	18.6–20.1	19.4±0.08
Interorbital width	12	13.7–15.8	14.8±0.17	25	14.9–17.5	15.7±0.13
Preorbital depth	12	6.1– 8.4	7.0±0.21	25	5.9– 8.7	7.4±0.18
Caudal peduncle depth	12	20.4–22.6	21.7±0.20	25	21.6–24.6	23.0±0.14
Caudal peduncle length	12	4.3– 6.4	5.7±0.18	25	5.1– 7.0	6.1±0.11
Pectoral fin length	11	26.7–28.6	27.7±0.21	25	28.0–32.4	29.6±0.19
Last D spine length	12	20.2–25.2	22.3±0.49	24	22.3–26.6	24.8±0.23

TABLE 9.

Measurements of *Mesonauta acora* from the Rio Xingu and Tocantins, in per cent of SL, except SL (in mm).

Measurement	<i>M. acora</i> XINGU		<i>M. acora</i> TOCANTINS	
	N	Min-max $\bar{x}\pm SE$		
SL (mm)	10	34.6–70.5		59.3 65.3
Head length	10	32.3–35.7	33.4±0.34	32.2 32.9
Snout length	10	8.4–10.8	9.3±0.21	10.1 10.6
Body depth	10	49.2–54.3	51.6±0.48	54.5 52.5
Orbital diameter	10	12.1–15.3	13.8±0.34	12.6 12.1
Head width	10	17.6–18.8	18.2±0.12	18.5 17.8
Interorbital width	10	14.2–15.7	14.8±0.13	16.4 15.6
Preorbital depth	10	4.6– 8.4	6.3±0.36	8.4 8.0
Caudal peduncle depth	10	20.3–22.0	21.0±0.17	21.8 22.1
Caudal peduncle length	10	4.7– 6.6	5.9±0.17	4.0 6.4
Pectoral fin length	8	24.6–26.6	25.6±0.24	27.2 27.6
Last D spine length	10	23.0–26.7	24.7±0.39	22.8 23.7

TABLE 10.

Measurements of *Mesonauta egregius* and *M. mirificus*, in per cent of SL.

Measurement	<i>M. egregius</i>			<i>M. mirificus</i>		
	N	Min-max N=7, 41.1–75.9 mm SL	$\bar{x}\pm SE$	N	Min-max N=30, 36.4–86.2 mm SL	$\bar{x}\pm SE$
Head length	7	32.8–35.1	33.9±0.33	30	33.2–36.8	34.4±0.19
Snout length	7	8.9–11.0	9.8±0.28	30	8.3–11.8	10.4±0.16
Body depth	7	50.7–55.6	53.4±0.63	30	49.8–55.8	52.9±0.26
Orbital diameter	7	12.1–15.1	13.8±0.45	30	11.7–15.4	12.8±0.17
Head width	7	18.6–20.0	19.3±0.22	30	17.9–20.9	19.4±0.14
Interorbital width	7	14.6–17.9	15.8±0.44	30	13.0–17.8	16.0±0.21
Preorbital depth	7	6.2– 9.9	7.7±0.54	30	6.3–10.0	8.1±0.16
Caudal peduncle depth	7	20.4–22.9	21.6±0.35	30	21.2–24.3	22.4±0.14
Caudal peduncle length	7	5.4– 6.6	6.0±0.17	30	4.1– 5.8	5.1±0.09
Pectoral fin length	7	27.3–30.2	28.3±0.38	29	27.7–31.5	28.9±0.20
Last D spine length	5	19.0–24.2	22.3±1.09	25	23.1–27.3	25.3±0.28